

**DEPARTMENTS OF VETERANS AFFAIRS AND
HOUSING AND URBAN DEVELOPMENT AND
INDEPENDENT AGENCIES APPROPRIATIONS
FOR FISCAL YEAR 2005**

THURSDAY, FEBRUARY 26, 2004

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 10 a.m., in room SD-192, Dirksen Senate Office Building, Hon. Christopher S. Bond (chairman) presiding.

Present: Senators Bond, Mikulski and Johnson.

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF SCIENCE AND TECHNOLOGY POLICY

STATEMENT OF JOHN H. MARBURGER, III, DIRECTOR

NATIONAL SCIENCE FOUNDATION

STATEMENT OF ARDEN L. BEMENT, JR., ACTING DIRECTOR

ACCOMPANIED BY:

WARREN M. WASHINGTON, CHAIR, NATIONAL SCIENCE BOARD
MARY E. CLUTTER, ASSISTANT DIRECTOR, BIOLOGICAL SCIENCES
CHRISTINE C. BOESZ, INSPECTOR GENERAL

STATEMENT OF SENATOR BARBARA A. MIKULSKI

Senator MIKULSKI [presiding]. In the spirit of bipartisanship, which is a characteristic of this subcommittee, I will start the hearing while we await the arrival of Senator Bond. Senator Bond is at the Banking Committee hearing to introduce the nominee for the Secretary of HUD and will be joining us shortly. We expect Senator Bond shortly, but if not, we will go ahead with our witness testimony. We do expect a vote between 11:00 and 11:30.

I want to welcome Dr. Marburger, Dr. Bement, and Dr. Washington to today's hearing. This is a very important hearing. We are tremendously interested in the issues to be presented by our panel; from the National Science Foundation, as well as the Chairman of the National Science Board, and, of course, the president's science advisor.

In terms of the National Science Foundation, it is my belief that the NSF is absolutely critical to our economy. The future tech-

nologies and future jobs depend upon National Science Foundation research. I believe that America needs to be safer, stronger, and smarter, and if we want safer, stronger, and smarter, there is no other agency than the National Science Foundation who can make such a tremendous contribution to our country.

NSF must lead the way in developing new technology, new thinking, new ideas, and new science to strengthen both our national security and our economic security. This is not just my view. Carly Fiorini, the Chair of Hewlett Packard, said, "We must focus on developing the next generation industries and the next generation talent and fields like biotech, nanotech, digital media distribution, around issues like IT security, mobility, manageability, that is going to create long-term growth here at home, while raising our living standards in the process. These will be the new ideas, for the new products, for the new jobs that won't be on a fast track to Mexico or a slow boat to China."

Twenty years ago, President Reagan created the President's Commission on Industrial Competitiveness. We were then facing other kinds of challenges to our economy. The Commission offered three recommendations on how to make sure America continued to lead the way in terms of economic competitors. First, promote research and development of new ideas and new technologies, improve education and training, and lower budget deficits. That triad, for the future of this country, is as relevant today as it was when the Commission made its report.

Following this simple formula, 35 million new jobs were created from the late 1980's until the late 1990's, the longest period of economic expansion in history. During the 1990's, I wrote my own vision of how we could cooperate with the Commission's recommendation. I proposed an idea that we should use both basic and applied research. I talked about strategic application of our research, not that we pick winners or losers, not that we have a European industrial policy, but that we organize our thinking in the way NIH does, like you do not have a national institute of microbiology, you have a national institute of heart, or the national institutes of viruses and allergies, and so on.

I am so proud that we win the Nobel Prizes, but I want to make sure we win the markets at home. That is why we believe we must focus our efforts on, first of all, basic science, in developing the new talent in the fields of basic science, and then also to promote cutting-edge technologies, like nanotech and biotech and info-tech. But in order to find that next generation of talent, we have to strengthen our educational system, K through 12, undergraduate, graduate, and post-doctoral.

We need to strengthen the role of our community colleges. We were so pleased the President talked about it in the State of the Union. It is the training ground for a high-tech workforce, but unfortunately, the budget that has been sent to this committee falls short in these very noble goals.

The proposed National Science Foundation budget is extremely disappointing. It is only 3 percent above last year. This is not satisfactory to this subcommittee, who, again, working on a bipartisan basis, said that we wanted to double the National Science Founda-

tion's budget the way Congress has been working towards doubling the National Institutes of Health's budget.

The increase barely accounts for inflation. I believe that it's not a National Science Foundation budget. I believe it's an OMB budget. In the omnibus bill last year, Senator Bond and I gave NSF a 4 percent increase over fiscal year 2003. We, again, will continue to work to double the National Science Foundation's budget. In order to meet that goal, we will need to have almost a 30 percent increase over the next few years.

A year ago, the President signed the NSF reauthorization act. It authorized the doubling of the NSF budget over 5 years. Under the authorization, we should be funding NSF at \$7.3 billion, but the 2005 budget provides only \$5.7 billion. If ever there was a call, because of the crisis that our Nation could face in the need for talent and the need for the basic ideas that are being developed, I believe that we need to treat this as a crisis.

Every major report on long-term economic growth cites the need for increases in scientific research and a smarter workforce. Strategic research is the foundation of future economic growth. The jobs of tomorrow will come from the research of today, but not with a 3 percent increase.

Nanotechnology is a good example. It could be the next breakthrough. We are already seeing it in carbon nanotubes and nanocircuits. Nanotech offers the ability to rejuvenate our manufacturing sector and create new high-paying quality jobs. I want to know, of course, in our conversation, where we stand with nanotech.

Let us move on, though, to education. I was so troubled to see that the education component was cut by 18 percent, compared to last year. This is the time we should be increasing our commitment to education, not cutting it, and not rearranging programs between NSF and other agencies. Graduate enrollment in science and engineering is down 50 percent over the past 10 years. Well, where is this new talent going to come from? Fifty percent of all graduate students are foreign nationals. That is not being prickly about them. It is being alarmed about ourselves.

Two years ago, again, working with my colleague, Senator Bond, at the suggestion of Dr. Colwell we increased the stipends for graduate research to \$30,000. We understand that has made a tremendous difference. Many often, those foreign nationals come with huge subsidies from their own country to learn in America, but America needs to learn that it has to do the same thing for our own kids right here.

While we are making progress with graduate students, we are losing ground with undergraduates. The biggest cut seems to come in the tech talent program, which Senator Bond and I created 2 years ago to get more undergraduate students in math, science, and engineering programs. We need a strong, steady, consistent level of support. We also need to support our K through 12 students and other informal education programs that get kids involved.

I also want to talk about the community colleges. Yes, we need to focus on wonderful academic centers of excellence. Two, Maryland and Hopkins, are in my own State, but we also have to focus

on the community college. I believe NSF can do more to help our community colleges educate and train the high-tech workers we need.

While we are working on the PhD students, and we should, there is this whole other group of people who can go into the tech fields, forensic tech, biotech, lab tech that we can focus on. In my own home State, Capital College, in Prince George's County, trains technicians who work at Goddard, operating satellite and communication systems. This marvelous school is a commuter school. It is a day-hop school. But I will tell you, for a lot of the young men and women in my own community who cannot or would not want to go to Maryland or one of the other schools, this is the gateway to opportunity, and boy, does Goddard need them.

There are many other things that we can talk about in informal science and in workforce readiness, but I believe that you know kind of the issues we are talking about. The other issue is to make sure that just as we want no child left behind, we need to make sure that the historically black colleges are, again, really strengthened and supported, because, again, this offers a cornucopia of talent for our country if we then get behind them.

So I know that this is what we want to talk about with the National Science Foundation. To the Board, Dr. Washington, I look forward to hearing your comments to know what the Science Board's vision is for the National Science Foundation, what you think about the world in which we find ourselves, and the world we want to live in. We have great respect for you, sir, and look forward to hearing from you.

Dr. Marburger, we are also very pleased to always hear from the President's science advisor on what are the administration's priorities. And we know that there have been some very troubling accusations about the administration engaging in junk science, and we would like to hear your views on that today and give you the opportunity to talk about how we are going to keep sound science as part of every agency.

PREPARED STATEMENT

Having said that, again, I want to welcome you on behalf of myself and Senator Bond. Know that we view this hearing as a very cordial and collegial dialogue. America is counting on us to not play politics with science and not play politics with the future of our competitiveness in the world. Senator Johnson.

[The statement follows:]

PREPARED STATEMENT OF SENATOR BARBARA A. MIKULSKI

Welcome Dr. Marburger, Dr. Bement and Dr. Washington.

The National Science Foundation is critical to our economy. Future technologies and future jobs depend upon NSF research. I believe in an America that is safer, stronger and smarter. NSF must lead the way in developing new technologies to strengthen our national security and our economic security.

This is not just my view. In a recent Wall Street Journal article, Carly Fiorina, the Chairman of Hewlett-Packard, said: "We must focus on developing next generation industries and next generation talent—in fields like biotechnology, nanotechnology and digital media distribution; around issues like IT security, mobility and manageability that will create long term growth here at home while raising our living standards in the process."

JOBS

Almost 20 years ago, President Ronald Reagan created the President's Commission on Industrial Competitiveness. This Commission offered three recommendations on how to improve America's economic competitiveness: (1) promote research and development of new technologies; (2) improve education and training; and (3) lower budget deficits.

Following this simple formula, 35 million new jobs were created from the late 1980's through the late 1990's—the longest period of economic expansion in history.

PRIORITIES

In the early 1990's, I offered my own vision of what government's role in research should be. I proposed the radical idea that we should support both basic and applied research. I believed we needed to start focusing on the strategic application of our research. We win the Nobel Prizes and they win market share.

That's why I believe we must focus our effort on promoting cutting edge technologies like nanotechnology, information technology and biotechnology.

We have to strengthen our educational system—all the way from K–12, undergraduate, graduate and post-doctoral. We need to strengthen the role of our community colleges, which have become the training ground for the high tech workforce.

Unfortunately, the budget that has been sent to this Committee falls short in many of these areas.

BUDGET SUMMARY

The proposed NSF budget for 2005 is just 3 percent above last year. The research budget—the very core of NSF's budget—is increased by just 3 percent over last year. This barely accounts for inflation.

A year ago, I was disappointed with the NSF budget. I am still disappointed. This is not an NSF budget. It's an OMB budget.

In the Omnibus, Senator Bond and I gave NSF a 7 percent increase over last year. Senator Bond and I are committed to doubling NSF's budget. It's bi-partisan and bi-cameral. But we cannot do it alone. In order to meet that goal, we will need a 20 percent increase this year.

Just over a year ago, the President signed the NSF Authorization Act. It authorized the doubling of NSF's budget over 5 years. Under the NSF Authorization, NSF should be funded at \$7.3 billion for fiscal year 2005. But the fiscal year 2005 budget provides only \$5.7 billion for NSF—\$1.7 billion less than was promised in the authorization.

We need to do more than just keep up with inflation.

Senator Bond and I have led a bi-partisan effort to double NSF research but we can't do it alone.

RESEARCH

Every major report on long-term U.S. economic competitiveness has cited the need for a major increase in scientific research. Basic research (physics, chemistry, etc.) and strategic research (nano, bio and info) are the foundations of future economic growth. The jobs of tomorrow will come from the research of today. But not with 3 percent increases.

More funding for basic and applied scientific research means more jobs for our economy. Our competitors are not waiting. We cannot afford to lose our advantage in science and technology.

NANOTECHNOLOGY

Nanotechnology could be the next industrial revolution. We are already seeing breakthroughs in carbon nano-tubes and nano-circuits. The potential to transform our economy is almost limitless.

Nanotechnology offers us the ability to rejuvenate our manufacturing sector and create new high paying, high quality jobs. I want to know where we stand with Nano and where we are going. What industries and sectors are we focusing on and what goals are we setting?

EDUCATION

The education budget is cut by 18 percent compared to last year. This is the time we should be increasing our commitment to education, not cutting it. Our economy needs more scientists, engineers and researchers. Graduate enrollment in science

and engineering is down 50 percent over the past 10 years. Fifty percent of all graduate students are foreign nationals.

Stipends

Two years ago, I led the effort to increase graduate stipends. At that time, stipends were \$18,500. Now, thanks to Senator Bond and I, stipends are \$30,000. Since we began raising the stipends, NSF has seen a significant increase in graduate fellowship applications.

While we are making progress with graduate students, we seem to be losing ground with undergraduates. The budget proposes to cut undergraduate education. The biggest cut is in the Tech Talent program. Senator Bond and I created this program 2 years ago to get more undergraduate students interested in math, science and engineering.

This cut is the wrong approach.

We need a strong, steady and consistent level of support for education starting with K-12, undergraduate, graduate, post-graduate.

Community Colleges

This is where our community colleges can play a role. NSF can't just focus on the Johns Hopkins and the Marylands. It must also focus on the Anne Arundel Community Colleges of this country. NSF can do more to help our community colleges educate and train the high-tech workers we need. Whether part time or full time, community colleges are the main source of higher education for large segments of our society.

Technicians of all kinds are in high demand and our community colleges are the training ground for these technicians. For example, in Maryland, Capitol College in Prince George's County trains technicians who work at Goddard operating satellites and communications systems. They offer a variety of programs to meet Goddard's needs and the needs of local contractors who work with Goddard.

Our community colleges are not only training grounds for technical skills, they are also stepping stones for higher education and lifetime learning.

Informal Science (Science Museums)

Senator Bond and I have been major supporters of NSF's informal science program. We increased this program from \$50 million to \$62 million because of its value to education. Supporting our science museums and science centers have been very successful as a teaching tool for kids.

There is no reason to cut this program as the budget proposes.

This program has been a great vehicle for translating and teaching the lessons from Hubble, Mars and the other successful science programs that we have seen. NASA has had 8 billion hits to its website since January 2—all because of Mars and Hubble.

Informal science brings these magnificent discoveries directly to kids and gets them excited about science. It also brings parents and children together. Parents and children can go to the science centers and science museums and learn together.

WORKFORCE READINESS

We do not have a jobs shortage in this country. We have a skills shortage. Almost every job today requires a working knowledge with technology. We have heard from numerous CEOs about the lack of technical skills in our workforce.

Math and science test scores show that U.S. 8th grade students finish behind students in Singapore, Japan, South Korea and five other countries.

The Labor Department estimated that 60 percent of the new jobs being created in our economy today will require technological literacy. Yet, only 22 percent of the young people entering the job market now actually possess those skills.

Women and minorities are the fastest growing part of our workforce, but represent a tiny fraction of our science and technology workforce.

We need more support for our Historically Black Colleges and Universities. The HBCU THRUST program and the Louis Stokes Alliance are a critical part of this effort and need more support, not less.

We have annual discussions about visas for foreign students and workers to fill high tech jobs in the United States. I welcome foreign students and workers to the United States. But there should be sufficient U.S. workers filling these jobs.

NSF needs to be the leader in creating more science and engineering students and more science and engineering workers.

OFFICE OF SCIENCE AND TECHNOLOGY POLICY (OSTP)

We look to the Office of Science and Technology Policy to set national policy guidance across scientific disciplines. I want to know about the White House policy on balancing the competing needs of the various scientific disciplines—the life sciences versus the physical sciences.

We have doubled funding for NIH—what about funding for NSF? Is there a long term vision? What is the plan to integrate science policy with economic policy? How do we stack up compared to our international competitors?

National Science Board

And finally, I'd like to know from Dr. Washington what the Science Board's vision is for NSF's future. Where do we go from here and how do we get there?

I hope OMB will someday get the message. NSF has broad bi-partisan support to double its funding. It's critical to our future, to our economy and to our security. Without a significant increase in NSF funding, we will continue to win the Nobel prizes while our competitors win market share.

This is about jobs and our economy and our Nation's future. It's about economic security and national security.

STATEMENT OF SENATOR TIM JOHNSON

Senator JOHNSON. Thank you, Senator Mikulski. I share your very able observations that you have shared here today, and I am very appreciative of your leadership and Senator Bond's leadership on this committee. I will be very brief, but I do have a few thoughts that I would like to share on the record.

I strongly support efforts to increase funding for the National Science Foundation, and I commend the Chairman and the ranking member for their extraordinary leadership and dedication to double NSF's annual budget. NSF is critical to support scientific exploration and science education, and to preserve our Nation's status as an economic and technological force in the world.

The EPSCoR program, for example, is critical to enhance the capacity of small States to contribute to our technological achievements and innovation. I am enthusiastic that the NSF has selected Dr. Sherry Farwell to lead the Foundation's EPSCoR program.

Dr. Farwell has been a great asset in his current position at the South Dakota School of Mines and Technology. And while we are sad to see him leave South Dakota, we acknowledge that our loss is our Nation's gain. I will continue to be a strong supporter of EPSCoR, and I am confident that Dr. Farwell will serve the NSF with distinction in the coming years.

Secondly, the NSF has recently announced that it will conduct meetings in March with scientists from around the Nation to evaluate the merits of establishing a national underground science program. Such a program has far-reaching opportunities to unlock many existing mysteries about the origins of the universe. Successful deep experiments at the Homestake Mine in South Dakota, for example, have already contributed to the award of a 2002 Nobel Prize for physics to Dr. Ray Davis of the University of Pennsylvania.

I congratulate the NSF for the deliberate and thoughtful science approach to consider developing such a program. There appears to be strong support within the science community that such a program will contribute significant opportunities to advance numerous disciplines in science. I support the NSF's efforts to thoroughly peer-review the science as well as various proposals to establish the most beneficial research facilities. As the NSF and the science

community review the merits of the science and specific proposals, I hope that you will keep us informed of your findings and intentions.

Thirdly, lastly, I want to raise for Dr. Marburger my concern that we develop a more coordinated Federal policy towards remote sensing technologies. Last May, a malfunction aboard the LANDSAT-7 satellite resulted in significant degradation of the image data that the satellite may collect. The LANDSAT program has collected and distributed a 32-year continuous record of the land surfaces of the world. This data, which is collected and distributed by the U.S. Geological Survey, is a significant resource for applications by various entities throughout the Federal Government, including the USAID, the Department of Agriculture, the Department of Defense, Homeland Security, and Environmental Applications.

In fact, the program has become so successful that a significant portion of the program's budget is recovered through outside data sales, but currently, there appears to be no real plan in place to replace this critical hardware. It is critical that we take all necessary actions to restore the full capabilities of the program and recapture the markets for this valuable data.

The current difficulties we are experiencing, however, are exacerbated by what appears to be a lack of clear remote sensing mission. Over the last 32 years the responsibilities over the program have been shifted between several agencies, and this has led to some confusion and lack of consistent leadership. I believe that we need to establish a clearly defined remote sensing mission. The U.S. Geological Survey is, I believe, uniquely positioned to work with all the various Federal and private entities which utilize this data, and that we should provide the USGS the task and responsibility of coordinating and implementing that process. I hope that the Office of Science and Technology Policy will support this important goal.

So Mr. Chairman, Madam ranking member, thank you for your leadership. I also thank the distinguished panelists for their leadership on the critical areas of science. And I look forward to working with Senator Bond as he chairs this committee and we commence on what no doubt will be a difficult fiscal year, but one where science should continue to play a very leading role. Thank you, again.

OPENING STATEMENT OF SENATOR CHRISTOPHER S. BOND

Senator BOND [presiding]. Thank you very much, Senator Johnson, and I think you were the master of understatement when you said it is going to be a difficult fiscal year. I just came with mixed emotions from a hearing where I did something that causes me qualms. I recommended my very good friend, Alfonso Jackson, to be Secretary of HUD. Given the fiscal problems he faces, I hate to do that to a friend and a good man.

We are here today to talk about the National Science Foundation, the Science Board, and the Office of Science and Technology Policy. I welcome Dr. Marburger, Dr. Bement, and Dr. Washington. Thank you very much for joining us today. I know that Dr. Bement has recently come into the temporary position. I am interested in

hearing your first impressions of the Foundation, and in understanding how you are going to handle your responsibilities as both acting director of NSF and as director of NIST. It sounds like more than a 40-hour-a-week job.

As many of you know, Senator Mikulski and I have been, and we will continue to be extremely strong supporters of the NSF and a robust budget for the NSF. As a result, this is an important hearing, because it gives us an opportunity to talk about the critical role that NSF plays in the economic, scientific, and intellectual growth of the Nation.

Science and technology is our future, make no mistake about it. When we talk about jobs, we will not be talking about the manufacturing of T-shirts and sneakers. We will be talking about the development of cutting-edge technologies that should speed the flow of information, which will improve the quality of crops and food to feed the world, and which will make the quality of life for people everywhere better.

This vision of the world is what NSF is all about, the strategic Federal investment in scientific research, particularly the funding and support of NSF has directly led to innovative developments in scientific knowledge and dramatically increased the economic growth of this Nation. Unfortunately, while Federal support in life sciences continues to receive significant increases, the combined share of the funding for the physical sciences and engineering has not kept pace. I am alarmed by this disparity, because the decline in funding for physical sciences has put our Nation's capabilities for leading the world in scientific innovation at risk, and equally important, at risk of falling behind other advanced nations.

Most experts believe that investment in the physical sciences and engineering not only benefits specific industries, but all major research areas. A scientist working on basic research in all disciplines makes new discoveries and better understands the world around us. Their research can cross disciplines and have decisive impacts on many scientific areas, including biomedical research.

In the words of Harold Varmus, the former director of the National Institutes of Health, "Scientists can wage an effective war on disease only if we harness the energies of many disciplines, not just biology and medicine." To put it plainly, supporting NSF supports NIH, and I believe that funding for NSF should keep pace with funding for NIH. But unfortunately, this is not happening.

Senator Mikulski and I have led an effort in Congress to double NSF's budget. We were pleased with the PCAST, when it recommended to the President, "Beginning with the FY04 budget and carrying through the next four fiscal years, funding for physical sciences and engineering across all relevant agencies be adjusted upward to bring them collectively to parity with the life sciences". I am sorry that the memo did not get to OMB.

I was very disappointed that the budget request only provided NSF with \$5.75 billion for 2005, an increase of only \$167 million, or 3 percent over the 2004 level. I am not great at math, but I believe about a 14.7 percent increase is what is needed to get you to doubling of the budget in 5 years. This is even less of an increase as proposed in last year's budget.

OMB's budget request for NSF is especially disappointing, given the scientific, economic, and educational importance of its programs. However, with major funding shortfalls throughout the VA-HUD accounts, it is going to be a major and perhaps impossible challenge to find any additional funds for NSF for 2005.

I remain committed to NSF, but this year's budget is the most difficult we have seen in years. I want to work with the administration, but we need to find ways to increase the NSF budget as we move forward, if not this year, at least next year. Maybe, Dr. Marburger, you can hand-carry the PCAST recommendation to OMB.

It is a tight budget year. Tough choices will have to be made. I acknowledge Dr. Bement's testimony, stating that in a year of tight budgets, it was necessary to set priorities and make informed, but tough choices. I could not agree more with that statement. But looking at the priorities made in the NSF's budget, I must disagree with the choices made even within the budget.

The most troubling choices in the budget request are cuts to programs that support smaller or under-represented research institutions. OMB proposes only \$84 million for EPSCoR, a program cut by 11 percent from the 2004 level. It is key to the continued growth of science research in underserved States. Minority programs at NSF are another example. The Lewis-Stokes Alliance for Minority Participation is flat-funded, and the HBCU Undergraduate's Program, historically black colleges and universities, is cut by \$4 million, or 16 percent.

Further, the administration cuts \$4 million from the CREST program, supporting centers for research at minority institutions. These cuts are unacceptable. Our lack of new scientists and engineers is becoming a national crisis, and we are not attracting young students, especially minorities, into these disciplines. In the past, we relied on foreign students to stay in the United States and fill the gap created by retiring engineers and scientists. This is no longer the case. We need to grow new engineers and scientists, and these minority NSF programs represent a tremendous opportunity to develop these new engineers and scientists.

Informal Science education takes a cut in this budget request of \$12 million, or 20 percent. Very troubling. The program has been highly successful. And the programs receiving funding have received national recognition, including an Emmy, for their efforts to reach the public and engage them in science. I have seen firsthand the value of informal science education at the St. Louis Science Center, where children of all ages are able to receive hands-on experience in scientific activities.

The cut to the Tech Talent or "STEP" program, also disappoints me. At a time where the number of U.S. undergraduates in engineering and math is declining, a 40 percent reduction in this program is puzzling.

I also have a strong interest in nanotechnology. The fiscal year 2005 request provides an increase of \$52 million over the 2004 level. There is a tremendous amount of excitement about nanotechnology, because of its far-reaching benefits, from computers, to manufacturing processes, to agriculture, to medicine. As NSF is the lead agency in Federal nanotechnology research, I am

encouraged to see the request reflect the importance of this emerging research field.

Despite the promises of nanotechnology, there is a growing “public anxiety and nascent opposition” to nanotechnology, according to a recent Washington Post report. I agree with the view that nanotechnology is the foundation for the next industrial revolution. I am troubled with the Post’s view that, “[i]f nano supporters play their cards wrong by belittling public fears, the industry could find itself mired in a costly public relations debacle, even worse than the one that turned genetically engineered crops into Frankenfood”.

I think it is critical that the Federal Government and the research community act together in educating the public about science. We cannot afford public fears to go unaddressed. This pseudoscience, this hysteria fawned by groups with their own agendas, is unacceptable.

As everybody knows, I am a big supporter of plant biotechnology, because it is generating exciting possibilities for improving human health and nutrition. Impressive research is being done with plant genomics, which can eventually be a very powerful tool for addressing hunger in many developing countries, such as those in Africa and Southeast Asia.

The 2005 budget request provides \$89 million for the NSF plant genome program. This keeps the funding level with the amount appropriated in fiscal year 2004. I am pleased that at least one of my priorities is not cut. Nevertheless, the level of funding is not enough to meet the goals of the National Science and Technology Council’s report, which recommends the Federal Government invest \$1.3 billion over the next 5 years on plant genome research.

In addition to my concerns about funding, I have a couple of policy and programmatic areas of concern. I am interested in the National Science Board’s operations, now that the Board has had a year to operate with its own budget to meet its statutory responsibilities. With its own budget and authority to hire its own staff, I want to know how the Board is making its statutory responsibility to provide the Congress and President with independent science policy advice and oversight.

PREPARED STATEMENT

Lastly, there are some points about the National Academy of Sciences’ report on large facility projects. The Foundation’s process for prioritizing its large facility projects has been a concern to me. As a matter of fact, I have wondered whether there is a process. At my request, along with Senator Mikulski and the chair and ranking member of the Senate authorizing committee, we asked the NAS to set forth criteria to rank and prioritize large research facilities supported by NSF. The Academy presented their recommendations to the NSF last month. I support the recommendations and expect NSF to implement them as soon as possible and to present the Committee with a revised MREFC request based on these criteria. NSF must have a priority-setting process that is credible, fair, rational, and transparent. Until we get that, it is going to be difficult for me to support any new MREFC proposals.

I look forward to hearing the testimony of all the witnesses today, and I thank you for giving me the time to express some of my views and concerns.

[The statement follows:]

PREPARED STATEMENT OF SENATOR CHRISTOPHER S. BOND

The subcommittee will come to order. This morning, the VA–HUD and Independent Agencies Subcommittee will conduct its budget hearing on the fiscal year 2005 budgets for the National Science Foundation, the National Science Board, and the Office of Science and Technology Policy. I welcome back Dr. John Marburger from OSTP, and Dr. Warren Washington from the National Science Board to our subcommittee. I also want to welcome Dr. Arden Bement, the acting director of NSF to today's hearing. I know that you have recently come into this temporary position, and I am interested in hearing your first impressions about the Foundation. I am especially interested in understanding how you are handling your responsibilities as both acting director of NSF and as director of NIST.

As many of you know, I have been and will continue to be a strong supporter of NSF and a robust budget for NSF. As a result, this is a very important hearing because it gives me the opportunity to talk about the critical role NSF plays in the economic, scientific and intellectual growth of this Nation. Science and technology is the future. When we talk about jobs, we will not be talking about the manufacturing of t-shirts and sneakers; we will be talking about the development of cutting edge technologies that will speed the flow of information, which will improve the quality of crops and food to feed the world, and which will make the quality of life for people everywhere better. This vision of the world is what NSF is all about. The strategic Federal investment in scientific research, and particularly the funding support at NSF, has directly led to innovative developments in scientific knowledge and dramatically increased the economic growth of this Nation.

Unfortunately, while Federal support in life sciences continues to receive significant increases, the combined share of the funding for the physical sciences and engineering has not kept pace. I am alarmed by this disparity because the decline in funding for the physical sciences has put our Nation's capabilities for leading the world in scientific innovation at risk and, equally important, at risk of falling behind other industrial nations. Most experts believe that investment in the physical sciences and engineering not only benefits specific industries, but all major research areas. As scientists working on basic research in all disciplines make new discoveries and better understand the world around us, their research can cross disciplines and have decisive impacts on many scientific areas, including biomedical research. In the words of Dr. Harold Varmus, the former Director of the National Institutes of Health, "scientists can wage an effective war on disease only if we . . . harness the energies of many disciplines, not just biology and medicine." To put it plainly, supporting NSF supports NIH. And I believe that funding for NSF needs to begin to keep pace with the funding for NIH. Unfortunately, this is not happening.

My good friend and colleague Senator Mikulski and I have led an effort in Congress to double NSF's budget. We were pleased when PCAST recommended to the President, "beginning with the fiscal year 2004 budget and carrying through the next four fiscal years, funding for physical sciences and engineering across all relevant agencies be adjusted upward to bring them collectively to parity with the life sciences."

With this in mind, I was disappointed that the budget request only provided NSF with \$5.75 billion for fiscal year 2005—an increase of only \$167 million or 3 percent increase over the fiscal year 2004 enacted level. This proposed increase is even less than the increase proposed in last year's budget request.

OMB's budget request for NSF is disappointing given the scientific, economic, and educational importance of its programs. However, with major funding shortfalls throughout the VA–HUD account, it is going to be a major and perhaps an impossible challenge to find additional funds for NSF for fiscal year 2005. I am committed to NSF, but this year's budget is the most difficult I have seen in years. I want to work with the Administration, but we need to find ways to increase NSF's budget as we move forward, if not this year, next year.

This is a very tight budget year and tough choices will have to be made. I acknowledge Dr. Bement's testimony where you state, "in a year of very tight budgets, it was necessary to set priorities and make informed, but tough choices." I could not agree with that statement any more. However, looking at the priorities made in NSF's budget, I strongly disagree with some of the choices.

The most troubling choices in the budget request are the cuts to programs that support smaller or underrepresented research institutions. For example, the Administration proposes only \$84 million for the EPSCoR program—a cut by 11 percent from the fiscal year 2004 level of \$95 million. This program is key to the continued growth of science research in underserved States.

Minority programs at NSF are another example. The Louis Stokes Alliances for Minority Participation program is flat funded in the request, and the HBCU Undergraduates Program is cut by \$4 million, or 16 percent. Further, the Administration cuts \$4 million from the “CREST” program that supports centers for research at minority institutions. These cuts are unacceptable to me. Our lack of new scientists and engineers is becoming a national crisis, and we are not attracting young students, especially minorities, into these disciplines. In the past, we relied on foreign students to stay in the United States and fill the gap created by retiring engineers and scientists. This is no longer the case. We need to grow new engineers and scientists and these minority NSF programs represent a tremendous opportunity to develop these new engineers and scientists.

Informal Science education receives a cut of \$12 million, or 20 percent. Again, very troubling. This program has been highly successful and the programs receiving funding have received national recognition, including an Emmy, for their efforts to reach the public and engage them in science. I have seen first hand the value of Informal Science Education funding at the St. Louis Science Center where children of all ages are able to receive hands-on experience in scientific activities.

The cut to the tech talent or “STEP” program also disappoints me. At a time where the number of U.S. undergraduates in engineering and mathematics is declining, a 40 percent reduction in this program is puzzling.

I also have a strong interest in nanotechnology. The fiscal year 2005 request provides an increase of \$52 million over the fiscal year 2004 level for this important program. There is a tremendous amount of excitement about nanotechnology because of its far-reaching benefits from computers to manufacturing processes to agriculture to medicine. As NSF is the lead agency in the Federal nanotechnology research effort, I am encouraged to see the request reflect the importance of this emerging research field.

Despite the promises of nanotechnology, there is growing “public anxiety and nascent opposition” to nanotechnology, according to a recent Washington Post article. I agree with the view that nano is the foundation for the next industrial revolution. However, I am troubled with the Post’s view that “if nano’s supporters play their cards wrong . . . by belittling public fears . . . the industry could find itself mired in a costly public relations debacle even worse than the one that turned genetically engineered crops into Frankenfood.” It is critical that the Federal Government and the research community act together in educating the public about the science. We cannot afford public fears to go unaddressed.

As everyone knows, I am a big supporter of plant biotechnology because it has generated exciting possibilities for improving human health and nutrition. The impressive research being done with plant genomics can eventually be a very powerful tool of addressing hunger in many developing countries such as those in Africa and Southeast Asia. The fiscal year 2005 budget request provides \$89 million for the NSF plant genome program. This keeps the funding level with the amount appropriated in fiscal year 2004. I am pleased that at least one of my priorities is not cut. Nevertheless, level funding is not enough to meet the funding goals of the National Science and Technology Council’s report, which recommends the Federal Government to invest \$1.3 billion over the next 5 years on plant genome research.

In addition to my concerns about funding, I have a couple of policy and programmatic areas of concern. First, I am interested in the National Science Board’s operations now that the Board has had a year to operate with its own budget to meet its statutory responsibilities. With its own budget and authority to hire its own staff, I would like to know how the Board is meeting its statutory responsibility to provide the Congress and the President with independent science policy advice and oversight.

Lastly, I would like to raise a few points about the recent National Academy of Sciences report on Large Facility Projects. The Foundation’s process for prioritizing its large facility projects has been a concern to me. At my request, along with Senator Mikulski and the Chairs and Ranking Members of the Senate authorizing committees, we asked the National Academy of Sciences to develop a set of criteria to rank and prioritize large research facilities supported by NSF. The Academy presented their recommendations to the NSF last month. I support the Academy’s recommendations and expect NSF to implement them as soon as possible and to present the Committee with a revised MREFC request based on the Academy’s criteria. NSF must have a priority-setting process that is credible, fair, rational, and

transparent. Until then, it will be difficult for me to support any new MREFC proposals.

I look forward to hearing the testimony of all the witnesses today and I will now turn to my colleague and ranking member, Senator Mikulski, for her statement.

Senator BOND. We will start first with Dr. Marburger. Welcome, Doctor.

STATEMENT OF JOHN H. MARBURGER, III

Dr. MARBURGER. Thank you very much, Chairman Bond. It is a pleasure to be here. Ranking Member Mikulski. I welcome the opportunity to present important highlights from the President's fiscal year 2005 Federal research and development budget, including the request for NSF, which we are all looking forward to hearing more detail about from its new acting director, Dr. Bement.

I very much appreciate the productive relationship with this committee and look forward to its continuation. Your continued support of the Nation's research enterprise is critical to maintaining U.S. leadership in science and technology, and I certainly agree with the very positive comments about the importance of science and technology to our Nation's economic well-being and competitiveness.

This budget, the President's budget, focuses on winning the war on terrorism, securing our homeland, and sustaining the economic recovery now under way. But it also focuses, as you have noted, Mr. Chairman, on controlling and reducing the deficit, while implementing pro-growth policies.

When national and homeland security needs are excluded from this budget, all other discretionary spending growth amounts to less than a one-half percent increase. This necessarily restricts funding available to R&D programs. The overall picture for fiscal year 2004 R&D investment, however, is positive, in my opinion, and reflects the administration's conviction that science and technology is basic to our three primary goals.

With this budget, total R&D investment during this administration's first term will be increased 44 percent, to a record \$132 billion in 2005. The non-security portion of R&D growth from fiscal 2004, from last year to this year, is 2.5 percent. The non-defense R&D share of total discretionary outlays is 5.7 percent, which is the third highest level in 25 years.

This budget reflects input from numerous expert sources, including the President's Council of Advisors on Science and Technology, which you mentioned, and from the science agencies, through an extensive interagency process, with which this committee is fully familiar.

In my oral testimony, I am simply going to touch on highlights. There is more detail in my written testimony, and I, of course, will be prepared to answer questions about any aspect of it. But let me draw attention to some priorities that cut across all agencies, particularly education and workforce development, not confined solely to the National Science Foundation. A cluster of programs fostering innovation has received priority, including manufacturing R&D, networking, and information technology, and, of course, the National Nanotechnology Initiative.

Physical sciences and engineering enhancement, which you mentioned in your opening remarks, Mr. Chairman, which includes many programs at the National Science Foundation and NASA, does receive some priority emphasis in this budget, and finally, a better understanding of the global environment and climate change. These are all designated as priorities in a memorandum from the Office of Management and Budget and my office, earlier in 2004, and I believe those priorities are reflected in this admittedly difficult budget year.

This committee also appropriates the budget for OSTP, my office. Senator BOND. That is why you are here.

Dr. MARBURGER. I am grateful for that. It is a very important reason. There are bigger fish. The National Science Foundation obviously plays a very important role, and the other agencies for which you appropriate, but I am pleased to have the responsibility in the White House for prioritizing and recommending Federal R&D programs, and for coordinating interagency research initiatives.

The 2005 request for OSTP is \$7.081 million, which is a 1.4 percent increase from the previous year's, or current year's, enacted level. We have modest increases for the usual things—personnel, rental payments to GSA, and our supplies, materials, and equipment needs. The request also contains a decrease of \$48,000 in communications due to a realignment of telecommunications infrastructure costs to the Office of Administration.

We do operate as efficiently as we can. We also are participating in the President's management agenda, and we are confident that we can fulfill our obligations to Congress and the administration to provide high-quality science advice and coordination within this requested budget.

So let me hit some agency highlights. I will be brief about the National Science Foundation budget, because you will hear more about it from other panelists. This budget does provide \$5.75 billion for NSF, which is a 3 percent increase over the 2004 enacted level, considerably more, I might add, than the less one-half percent increase for the entire non-security discretionary budget. Since 2001, with the assistance of this committee, which we gratefully acknowledge, the National Science Foundation budget has increased by 30 percent during this administration.

The budget provides over a billion dollars for NSF awards that emphasize the mathematical and physical sciences. These programs have increased 31 percent in this administration.

NSF participates strongly in the administration's cross-agency priority programs that I mentioned earlier in info, nano, and biotechnology, climate science, and education. The budget provides \$761 million for NSF's role in the National Information Technology R&D Initiative, and \$210 million for climate change science, \$305 million for NSF's lead role in the National Nanotechnology Initiative, which is a 20 percent increase in that initiative from this current year level.

Science and math education is strongly supported in this budget, with funds for 5,500 graduate research fellowships and traineeships, an increase of 1,800 in this administration. Annual stipends in these programs have increased to a projected \$30,000,

compared with \$18,000 in the 2001 budget. We are quite grateful for your support and leadership in these issues.

Science infrastructure funding, which is an investment in the future, is provided to initiate construction in several important projects within the major research equipment area.

Let me just say a few words about other important agencies. The National Aeronautics and Space Administration. I recently testified before the House Science Committee on the President's vision for a sustainable, affordable program of human and robotic exploration of the solar system, and will be glad to answer further questions about it here, if you have them.

The budget requests \$16 billion for NASA, \$16.2 billion in 2005, and \$87 billion over 5 years, going forward, which is an increase of a billion over the fiscal year 2004 5-year plan for NASA. NASA will reallocate \$11 billion within this 5-year amount toward new exploration activity.

The budget does also include continued growth in space science, which is a very important mission for NASA, with a request for \$4.1 billion in fiscal year 2005, an increase of \$1.5 billion over the 4 years of this administration, a 50 percent increase in space science.

This budget supports the next generation of space observatories that will be used to better understand the origin, structure, and evolution of the universe. I might add that the National Science Foundation contributes significantly to that mission as well, and I am pleased with the cooperation between NSF and NASA, particularly on planning for deep space observations.

Within the Environmental Protection Agency, this budget provides nearly three-quarters of a billion dollars for EPA science and technology. We believe EPA is enhancing its overall scientific program to ensure that its efforts to safeguard human health and the environment are based on the best scientific and technical information.

In my written testimony, I described an important memorandum of understanding that was recently executed between EPA and the Department of Energy, which sets a very positive pattern of inter-agency cooperation for the future. It is a move that I am very pleased to see.

Within the Department of Veterans Affairs, the fiscal year 2005 budget provides approximately three-quarters of a billion dollars, \$770 million, for science and technology at the VA. After taking into consideration the significant funding the Department receives from other government agencies and private entities to support VA-conducted research, the total VA R&D program resources are at \$1.7 billion. It is a significant amount of research for that agency.

The VA will soon begin to use increased funding from private companies for the indirect administration costs of conducting research in VA facilities. The 2005 budget also reflects a restructuring of total resources in the research business line, as first shown in the current year budget.

PREPARED STATEMENT

I mentioned earlier a set of cross-agency priorities that are described in detail in my written testimony. I will not mention them

further here. I would be very glad to answer questions about them, but I do want to end by saying that this administration is taking pains to ensure that funds appropriated for science are wisely expended. There is a description of the President's management agenda, as applied to science, in my written testimony.

I will be glad to answer questions about it. Thank you, Mr. Chairman.

Senator BOND. Thank you very much, Dr. Marburger.
[The statement follows:]

PREPARED STATEMENT OF JOHN H. MARBURGER, III

Mr. Chairman and members of the Subcommittee, I welcome the opportunity to present important highlights of the President's fiscal year 2005 Federal research and development budget, including the request for the Office of Science and Technology Policy (OSTP).

I have appreciated my close and productive relationship with this Subcommittee and look forward to working with you again this year as you make important choices to optimize the Federal R&D investment. Your continued support of our country's research enterprise is yet another reason why the U.S. Government leads the world in science, engineering, technology, and productivity.

No Federal budget is ever "business as usual"—the stakes are simply too high. Yet, as we look together at the fiscal year 2005 budget, we should pause to consider the truly unique global forces shaping today's budgetary priorities. In his State of the Union address, the President reminded us that "our greatest responsibility is the active defense of the American people." This includes winning the war on terrorism, and securing our homeland. The President's budget focuses on these important goals and reinforces another critical priority, the economic recovery now underway. The Administration is also determined, without compromising the above priorities, to control and reduce the deficit, as we continue to implement pro-growth policies. The President has proposed a fiscally responsible budget that meets the Nation's expanding national and homeland security needs while limiting all other discretionary spending growth to less than 0.5 percent. This necessarily leads to smaller increases, and even decreases, for some categories, including some R&D programs. Nevertheless, the overall picture for fiscal year 2005 R&D investment is quite positive, reflecting the Administration's strong support for science and technology.

With the President's fiscal year 2005 budget, total R&D investment during this Administration's first term will be increased 44 percent, to a record \$132 billion in 2005 as compared to \$91 billion in fiscal year 2001. That equates to increases of nearly 10 percent each year. Significantly outpacing the fiscal year 2005 overall "non-security" discretionary spending growth of 0.5 percent, the non-security R&D growth rate is 2.5 percent. Science and technology drive economic growth. They help improve our health care, enhance our quality of life, and play an important role in securing the homeland and winning the war on terrorism. These increases reflect the Administration's appreciation of the importance of a strong national R&D enterprise for our current and future prosperity. The President's budget, as in years past, also continues to emphasize improved management and performance, to maintain excellence and sustain our national leadership in science and technology.

In my prepared statement I will review the broad goals of the President's budget, provide detail on OSTP's budget, and give an overview of the request for Federal research priorities that cut across multiple agencies and research disciplines.

THE PRESIDENT'S FISCAL YEAR 2005 R&D BUDGET

The President's fiscal year 2005 budget request commits 13.5 percent of total discretionary outlays to R&D, the highest level in 37 years. Not since 1968, during the Apollo program, have we seen an investment in research and development of this magnitude. Of this amount, the budget commits 5.7 percent of total discretionary outlays to non-defense R&D, the third highest level in 25 years.

Clearly demonstrating the President's commitment to priority investments for the future, Federal R&D spending in the fiscal year 2005 Budget is the greatest share of GDP in over 10 years. In fact, the last time Federal R&D has been over 1 percent of GDP was in 1993. And even more noteworthy, fiscal year 2005 non-defense R&D is the highest percentage of GDP since 1982.

Not all programs can or should receive equal priority, and this budget reflects choices consistent with recommendations from numerous expert sources. The pri-

ority programs in the Federal R&D budget build upon exciting areas of scientific discovery from hydrogen energy and nanotechnology to the basic processes of living organisms, the fundamental properties of matter, and a new vision of sustained space exploration. In particular, this budget responds to recommendations by the President's Council of Advisors on Science and Technology (PCAST) and others about needs in physical science and engineering.

The budget also reflects an extensive process of consultation among the Federal agencies, OMB, and OSTP, to thoroughly evaluate the agency programs and priorities, interagency collaborations, and directions for the future. The National Science and Technology Council (NSTC) continues to provide a valuable mechanism to facilitate this interagency coordination. This process of collaborative review resulted in guidance to agencies issued by OSTP and OMB last June, concerning their program planning, evaluation, and budget preparation, and culminating in the budget you see before you today.

An important component of this budget is an increase in funding for education and workforce development, which are essential components of all Federal R&D activities and continue to be high priorities for the Administration. As President Bush has stated, "America's growing economy is also a changing economy. As technology transforms the way almost every job is done, America becomes more productive, and workers need new skills."

As in previous years, this R&D budget highlights the importance of collaborations among multiple Federal agencies working together on broad themes. I will describe three high-priority R&D initiatives for fiscal year 2005: (1) a cluster of programs fostering innovation, which includes manufacturing R&D, networking and information technology, and the National Nanotechnology Initiative; (2) physical sciences and engineering enhancement, which includes many programs at the National Science Foundation and NASA; and (3) a better understanding of the global environment and climate change.

Office of Science and Technology Policy (OSTP)

The Office of Science and Technology Policy, which I lead, has primary responsibility in the White House for prioritizing and recommending Federal R&D, as well as for coordinating interagency research initiatives. The fiscal year 2005 request for OSTP is \$7,081,000, which is a 1.4 percent increase from the fiscal year 2004 enacted level. Some of the changes for this fiscal year include increases for personnel, rental payments to GSA, and supplies, materials, and equipment. The budget request also contains a decrease of \$48,000 in communications due to a realignment in telecommunications infrastructure costs to the Office of Administration.

The estimate for fiscal year 2005 reflects OSTP's commitment to operate more efficiently and cost-effectively without compromising the essential element of a top-caliber science and technology agency—high quality personnel. OSTP continues to freeze or reduce funding in many object classes, such as travel and printing, to meet operating priorities. OSTP will continue to provide high quality support to the President and information to Congress, as well as to fulfill significant national and homeland security and emergency preparedness responsibilities.

AGENCY BUDGET HIGHLIGHTS

National Science Foundation (NSF)

The 2005 Budget provides \$5.75 billion for NSF, a 3 percent increase over the 2004 enacted level. Since 2001, the NSF budget has increased by 30 percent.

The budget provides over \$1 billion for NSF awards that emphasize the mathematical and physical sciences, including mathematics, physics, chemistry, and astronomy. These programs have increased by 31 percent since 2001.

NSF participates strongly in this Administration's cross agency priority programs in information- and nano-technology, climate science, and education. This budget provides \$761 million for NSF's role in the National Information Technology R&D initiative, focusing on long-term computer science research and applications; \$210 million for climate change science; and \$305 million for NSF's lead role in the National Nanotechnology Initiative, a 20 percent increase from the 2004 level.

Science and math education is strongly supported in this budget, with funds for 5,500 graduate research fellowships and traineeships, an increase of 1,800 since 2001. Annual stipends in these programs have increased to a projected \$30,000, compared with \$18,000 in 2001.

The redirection of the Math and Science Partnerships (MSP) in the Department of Education reflects a desire to focus the program on integrating research-proven practices into classroom settings. The Budget requests \$349 million total for the joint MSP program in 2005, a \$61 million increase over the 2004 level. This increase

in the MSP program is a key component of the President's Jobs for the 21st Century Initiative. This initiative will better prepare high school students to enter higher education or the workforce since 80 percent of the fastest-growing jobs in the United States require higher education and many require math and science skills. Eighty million dollars of the overall program remains in NSF to continue ongoing commitments.

Science infrastructure funding, an investment in the future, is provided to initiate construction for the National Ecological Observation Network (NEON), the Scientific Ocean Drilling Vessel, and a set of experiments in fundamental physics called "Rare Symmetry Violating Processes" (RSVP).

National Aeronautics and Space Administration (NASA)

The President has committed the United States to a sustainable, affordable program of human and robotic exploration of the solar system. This vision supports advanced technology development with multiple uses that will accelerate advances in robotics, autonomous and fault tolerant systems, human-machine interface, materials, life support systems, and spur novel applications of nanotechnology and micro-devices. All of these advances, while pushing the frontiers of space, are likely to spur new industries and applications that will improve life on Earth.

To support this and other NASA missions, the Budget requests \$16.2 billion in fiscal year 2005 and \$87 billion over 5 years, an increase of \$1 billion over the fiscal year 2004 5-year plan. NASA will reallocate \$11 billion within this 5-year amount toward new exploration activities. Robotic trailblazers to the Moon will begin in 2008, followed by a human return to the Moon no later than 2020. The pace of exploration will be driven by available resources, technology readiness, and our ongoing experience.

The 2005 Budget supports a variety of key research and technology initiatives to enable the space exploration vision. These initiatives include refocusing U.S. research on the International Space Station to emphasize understanding and countering the impact of long-duration space flight on human physiology. In addition, the agency will pursue optical communications for increased data rates throughout the solar system, space nuclear power to enable high-power science instruments, advanced in-space propulsion technologies, and systems that enable robots and humans to work together in space.

The Budget continues the growth in space science with a request for \$4.1 billion in fiscal year 2005, an increase of \$1.5 billion, or over 50 percent, since 2001. This budget supports the next generation of space observatories that will be used to better understand the origin, structure, and evolution of the universe.

Although exploration will become NASA's primary focus, the agency will not forsake its important work in improving the Nation's aviation system, in education, in earth science, and in fundamental physical science.

Environmental Protection Agency (EPA)

The fiscal year 2005 budget provides nearly three-quarters of a billion dollars for EPA science and technology. The EPA is enhancing its overall scientific program to ensure that its efforts to safeguard human health and the environment are based on the best scientific and technical information.

One example of this enhancement was announced February 18 by Administrator Leavitt when he signed a Memorandum of Understanding with Energy Secretary Abraham. The purpose of the MOU is to expand the research collaboration of both agencies in the conduct of basic and applied research related to: (1) environmental protection, environment and energy technology, sustainable energy use, ecological monitoring, material flows, and environmental and facilities clean-up; (2) high-performance computing and modeling; and (3) emerging scientific opportunities in genomics, nanotechnology, remote sensing, bioinformatics, land restoration, material sciences, molecular profiling, and information technology, as well as other areas providing promising opportunities for future joint efforts by EPA's and DOE's research communities.

Two particular areas of note in the EPA request are homeland security research and water quality monitoring. EPA's homeland security research program will result in more efficient and effective threat detection and response for water systems. Additionally, EPA will develop practices and procedures that provide elected officials, decision makers, the public, and first responders with rapid risk assessment protocols for chemical and biological threats. On water quality, EPA will address the integration of different scales and types of monitoring to target effective water quality management actions and document effectiveness of water quality management programs.

Department of Veterans Affairs (VA)

The Fiscal Year 2005 Budget provides approximately three-quarters of a billion dollars (\$770 million) for science and technology at the VA, a 9 percent increase since fiscal year 2001. After taking into consideration the significant funding the Department receives from other government agencies and private entities to support VA-conducted research, Total VA R&D program resources are \$1.7 billion.

The proposed budget provides for clinical, epidemiological, and behavioral studies across a broad spectrum of medical research disciplines. Some of the Department's top research priorities include improving the translation of research results into patient care, special populations (those afflicted with spinal cord injury, visual and hearing impairments, and serious mental illness), geriatrics, diseases of the brain (e.g. Alzheimer's and Parkinson's), treatment of chronic progressive multiple sclerosis, and chronic disease management.

VA will soon begin to use increased funding from private companies for the indirect administration costs of conducting research in VA facilities. The 2005 Budget also reflects a restructuring of total resources in the Research Business Line as first shown in the 2004 Budget.

PRIORITY INITIATIVES

The 2005 budget highlights high-priority interagency initiatives described briefly below. These initiatives are coordinated through the National Science and Technology Council (NSTC) for which my office has responsibility for day-to-day operations. The Council prepares research and development strategies that cross agency boundaries to form a consolidated and coordinated investment package.

Innovation.—The Fiscal Year 2005 Budget calls for research and development investments to promote technological innovation in high-priority areas including manufacturing technology; information technology, and nanotechnology; the creation of incentives for increased private sector R&D funding; and stronger intellectual property protections. These investments will stimulate innovation and enhance U.S. competitiveness.

—*Manufacturing Technology.*—The President's Budget requests increased funding for a number of programs that strengthen manufacturing innovation, including those within the National Science Foundation's Design, Manufacture and Industrial Innovation Division—up 27 percent since 2001 to \$66 million—and the Manufacturing Engineering Laboratory at the National Institute of Standards and Technology (NIST)—up 50 percent since 2001 to \$30 million. The Fiscal Year 2005 Budget sustains funding for the Manufacturing Extension Partnership at the Department of Commerce at the 2004 level and proposes to implement reforms to improve the efficiency and effectiveness of the program.

—*Networking and Information Technology.*—Since 2001, funding for Networking and Information Technology R&D (NITRD) has increased by 14 percent to over \$2 billion, and the R&D funded by this effort has laid the foundation for many of the technological innovations that have driven the computer sector forward. The President's Fiscal Year 2005 Budget sustains this significant investment. One half of the NITRD budget is controlled by this Subcommittee and you have increased the funding of that part of the program by 26 percent since fiscal year 2001.

—*Nanotechnology.*—The President's Budget includes \$1 billion in funding to increase understanding, and develop applications based upon, the unique properties of matter at the nanoscale—that is, at the level of clusters of atoms and molecules. Funding for nanotechnology R&D has more than doubled since 2001. Nearly 35 percent of the President's request for funding of the National Nanotechnology Initiative is within this Subcommittee's purview. I want to thank this Subcommittee for its recognition of the importance of the nanotechnology R&D under your jurisdiction, which has increased by 67 percent since fiscal year 2001.

Physical Sciences and Engineering.—Research in the physical sciences and engineering is an essential component of space exploration, nanotechnology, networking and information technologies, biomedical applications, and defense technologies. Physical science research leads to a better understanding of nature and, indeed, our universe. Research in this area also complements a number of critical investments in other areas such as those being made in the life sciences. The 2005 Budget strengthens our Nation's commitment to the physical sciences and engineering, devoting significant resources to this priority area. The policy priority regarding the physical sciences responds to input and recommendations from PCAST.

Key activities in the physical sciences may be seen in selected programs in NSF, NASA's Space Science Enterprise, DOE's Office of Science, and the National Insti-

tute of Standards and Technology and National Oceanic and Atmospheric Administration in the Department of Commerce. Using these activities as a barometer of the health of physical science funding, the 2005 Budget requests \$11.4 billion, \$2.6 billion more than the fiscal year 2001 funding level. That's a 29 percent increase under this Administration. Within this total, Space Science grows 56 percent, from \$2.6 billion to \$4.1 billion over the last 4 years. And within NSF, the Mathematical and Physical Sciences, Geosciences, Computer and Information Science and Engineering, and Engineering Directorates rise 31 percent, from \$2.3 billion to over \$3 billion.

Climate Change and Global Observations.—For fiscal year 2005, the Administration is proposing to maintain funding at approximately \$2 billion for the Climate Change Science Program to increase our understanding of the causes, effects, and relative impacts of climate change phenomena. Nearly three-quarters of this climate change research money is allocated to NASA, NSF, and EPA, which are all agencies within this Subcommittee's jurisdiction. The Administration considers the development of an integrated, comprehensive, coordinated, and sustained global Earth observation system to be of high importance for numerous activities such as improved weather forecasts, improved land and ecosystem management, and improved forecasts of natural disasters such as landslides, floods, and drought; which all have high impact on national economic security and public health. Accurate and sustained global observations are critical for understanding our climate and how climate changes on various time scales. Environmental observations are also a critical component in an effective national response strategy for natural and terrorist incident management.

The Administration's 2005 Budget has accelerated by \$56.5 million the research on aerosols, oceans, and carbon cycle to contribute to filling knowledge gaps identified in the U.S. Climate Change Science Program Strategic Plan, which last week received high marks after a 6-month review from an independent committee convened by the National Research Council. Global observations of vertical distributions of size, composition, physical and optical properties of aerosols will help determine whether and by how much the overall effect of aerosols enhances heating or cooling of the atmosphere. With new observations from satellite, ships and land stations, the uncertainty about the role of aerosols in climate science is expected to be halved in 10 years.

Knowledge of regional sources and sinks of the global carbon cycle, essential for long term predictions of climate, require innovative new observations. Measurements of vertical profile of carbon dioxide in North America will be enhanced from land-based towers and aircraft. Additionally, the vast expanse of the world ocean is highly under sampled. The Administration will accelerate deployment of moored and free-drifting buoys to measure ocean temperature, salinity and other variables to observe the unsteady characteristics of ocean circulation. These measurements and the Administration's other observational assets contribute to the global Earth observation system.

MANAGING THE FEDERAL RESEARCH BUDGET

Research and development are critically important for keeping our Nation economically competitive, and will help solve the challenges we face in health, defense, energy, and the environment. Recognizing this, the Administration is investing in R&D at a rate of growth significantly greater than most other domestic discretionary spending. We all share the responsibility for ensuring the American people that these funds are invested wisely. Therefore, consistent with the Government Performance and Results Act, every Federal R&D dollar must be evaluated according to the appropriate investment criteria.

As directed by the President's Management Agenda, the R&D Investment Criteria were first applied in 2001 to selected R&D programs at DOE. Through the lessons learned from that DOE pilot program, the criteria were subsequently broadened in scope to cover other types of R&D programs at DOE and other agencies. To accommodate the wide range of R&D activities, a new framework was developed for the criteria to address three fundamental aspects of R&D:

- Relevance.*—Programs must be able to articulate why they are important, relevant, and appropriate for Federal investment;
- Quality.*—Programs must justify how funds will be allocated to ensure quality; and
- Performance.*—Programs must be able to monitor and document how well the investments are performing.

In addition, R&D projects and programs relevant to industry are expected to meet criteria to determine the appropriateness of the public investment, enable compari-

sons of proposed and demonstrated benefits, and provide meaningful decision points for completing or transitioning the activity to the private sector.

OSTP and OMB are continuing to assess the strengths and weaknesses of R&D programs across the Federal Government in order to identify and apply good R&D management practices throughout the government.

CONCLUSION

Mr. Chairman and members of the Subcommittee, I believe this is a good budget for science and technology. It is based on well-defined, well-planned, collaboratively-selected priorities. In a difficult budget year, this Administration remains committed to strong, sound research and development as the foundation for national security and economic growth and jobs. I would be pleased to respond to questions.

Senator BOND. I hope that next year if you are working on a budget that you can take your opening statement to OMB. You are preaching to a choir up here. We need to have some funds.

Dr. Bement.

STATEMENT OF ARDEN L. BEMENT, JR.

Dr. BEMENT. Thank you, Chairman Bond, Senator Mikulski, members of the Committee. I am pleased to appear before you today, my fourth working day since becoming Acting Director of NSF. I want to provide for you a quick overview of the NSF budget request for fiscal year 2005 and then find out what issues are of great concern to the Committee, which you have already provided.

As you undoubtedly know, NSF works hard to open new frontiers in research and education. And we have our eye on the biggest prize, namely, economic and social prosperity, and very importantly, security benefitting all citizens.

The most powerful mechanism for keeping our Nation prosperous and secure is keeping it at the forefront of learning and discovery. That is NSF's business, to advance fundamental research in science and engineering, to educate and train scientists and engineers, and to provide the tools to accomplish both of these.

First, the big picture. This year, NSF is requesting \$5.745 billion. That is an increase of \$167 million, or 3 percent more than last year. In spite of the significant challenges facing our Nation in security, defense, and the economy, NSF is, relatively speaking, doing well. An increase of 3 percent is a wise investment that will keep us on the right path. NSF is grateful for the leadership and the vision of this committee in that effort.

Having said that, in a year of very tight budgets, it was necessary to set the priorities and make informed, but tough, choices; never an easy job, and particularly difficult when opportunities to make productive investments are as plentiful as they are today in research and education.

The largest dollar increase is in the Research and Related Activities account, \$201 million, or 5 percent above the fiscal year 2004 level. The largest decrease in the budget will be in the Education and Human Resources Directorate, with the major share of the decrease due to the consolidation of the Math and Science Partnership at the Department of Education.

Nevertheless, NSF is increasing its investments in people, science and engineering students and researchers, as well as public understanding and diversity participation in science and engineering throughout all the directorates.

I will begin with the investment of Organizational Excellence. This investment will streamline and update NSF operations and management by allowing us to address mounting proposal pressure, add new skills to the workforce, and improve the quality and responsiveness for our customers. In fiscal year 2005, an increased investment of \$76 million in this area will ensure continued productive investments and continually improved performance in the future.

Today's science and engineering challenges are also more complex. Increasingly, they involve multi-investigative research, as well as strong emphasis on interdisciplinary research. Increasing award size and duration across-the-board therefore remains one of NSF's top long-term priorities. NSF will make additional progress in fiscal year 2005 with an increase in the average annual award. That brings the total increase from \$90,000 to \$142,000 since 1998, an increase of 58 percent.

Attracting the Nation's best talent into science and engineering fields will be facilitated by increasing the level of graduate stipends from a base of \$15,000 in 1999, to \$30,000 today. In fiscal year 2005, the number of fellows will increase from 5,000 to 5,500 for NSF's flagship graduate education programs.

NSF's five focused priority areas are slated to receive more than \$537 million in 2005. As the lead agency in the administration's national nanotechnology initiative, support for Nanoscale Science and Engineering will increase by 20 percent, to \$305 million. Support for Biocomplexity in the Environment and the Mathematical Sciences will continue at 2004 levels.

The Human and Social Dynamics priority area will receive \$23 million to investigate the impacts of change on our lives and the stability of our institutions, with special emphasis on the way people make decisions and take risks. The budget includes \$20 million to start NSF's Workforce for the Twenty-First Century priority area, critical, because it focuses on U.S. citizens and broadening participation.

Researchers need access to cutting-edge tools to tackle today's complex and radically different research. The fiscal year 2005 investment in tools is \$1.5 billion, an increase of \$104 million. It continues an accelerated program to revitalize and upgrade the Nation's aging research infrastructure through investments in cutting-edge tools of every kind. Nearly \$400 million of the fiscal year 2005 investment in tools supports the expansion of state-of-the-art cyber infrastructure.

PREPARED STATEMENT

Mr. Chairman, although I have been at NSF only a matter of days, as a former member of the National Science Board, I am very familiar with the agency, its history, and its goals. I recognize the need to identify clear priorities in a time of tight budgets, and, therefore, to make tough choices. NSF's fiscal year 2005 investments will have long-term benefits for the entire science and engineering community, and contribute to security and prosperity for our Nation.

Mr. Chairman, I would be happy to respond to any questions.
[The statement follows:]

PREPARED STATEMENT OF ARDEN L. BEMENT, JR.

Chairman Bond, Senator Mikulski, and Members of the Committee, I am pleased to appear before you today. For more than 50 years, the National Science Foundation (NSF) has been a strong steward of America's science and engineering enterprise. Although NSF represents roughly 3 percent of the total Federal budget for research and development, it accounts for one-fifth of all Federal support for basic academic research and 40 percent of support for basic research at academic institutions, outside of the life sciences. Despite its small size, NSF has an extraordinary impact on scientific and engineering knowledge and capacity.

During NSF's five decades of leadership, groundbreaking advances in knowledge have helped reshape society and enabled the United States to become the most productive Nation in history. The returns on NSF's strategic investments in science, engineering, and mathematics research and education have been enormous. Much of the sustained economic prosperity America has enjoyed over the past decade is the result of technological innovation—innovation made possible, in large part, by NSF support for fundamental research and education.

In our 21st century world, knowledge is the currency of everyday life, and the National Science Foundation is in the knowledge business. NSF's investments are aimed at the frontiers of science and engineering, where advances in fundamental knowledge drive innovation, progress, and productivity.

The surest way to keep our Nation prosperous and secure is to keep it at the forefront of learning and discovery. That is NSF's business—to educate and train scientists and engineers, advance fundamental research and engineering, and provide the tools to accomplish both. The NSF fiscal year 2005 budget request aims to do that, and I am pleased to present it to you today.

Let me begin with the big picture. This year the National Science Foundation is requesting \$5.745 billion. That's an increase of \$167 million, or 3 percent more than in the fiscal year 2004 enacted level.

In light of the significant challenges that face the Nation—in security, defense, and the economy—NSF has, relatively speaking, fared well. An increase of 3 percent, at a time when many agencies are looking at budget cuts, is certainly a vote of confidence in the National Science Foundation's stewardship of these very important components of the Nation's goals.

Nonetheless, in a year of very tight budgets, NSF has had to set priorities and make informed choices in a sea of opportunity and constraint. That is never an easy job, but it is particularly difficult when opportunities to make productive investments are as plentiful as they are today in research and education.

The NSF Fiscal Year 2005 Budget Request addresses these opportunities and challenges through an integrated portfolio of investments in People, Ideas, Tools, and Organizational Excellence. The NSF budget identifies what we see as NSF's most pressing needs during the coming year:

—*Strengthen NSF management to maximize effectiveness and performance.*—The Fiscal Year 2005 Request assigns highest priority to strengthening management of the investment process and operations. The budget request includes an increase of over \$20 million to strengthen the NSF workforce and additional investments of over \$50 million to enhance information technology infrastructure, promote leading-edge approaches to eGovernment, and ensure adequate safety and security for all of NSF's information technology and physical resources. It's a sizable increase, especially in a constrained environment, but it's really the minimum needed to keep pace with a growing workload and expanding responsibilities.

—*Improve the productivity of researchers and expand opportunities for students.*—Boosting the overall productivity of the Nation's science and engineering enterprise requires increasing average award size and duration. The recent survey of NSF-funded principal investigators provides convincing evidence that an increase in award size will allow researchers to draw more students into the research process, and increasing award duration will foster a more stable and productive environment for learning and discovery. The level proposed for fiscal year 2005 represents a 58 percent increase over the past 7 years in average annual award size.

—*Strengthen the Nation's performance with world-class instruments and facilities.*—In an era of fast-paced discovery and technological change, researchers need access to cutting-edge tools to pursue increasingly complex avenues of research. NSF investments not only provide these tools, but also develop and creatively design the tools critical to 21st Century research and education. Consistent with the recent recommendations of the National Science Board, invest-

ment in infrastructure of all types (Tools) rises to \$1.47 billion, representing 26 percent of the Fiscal Year 2005 Budget Request.

Targeted investments under each of NSF's four strategic goals will promote these objectives and advance the progress of science and engineering.

NSF STRATEGIC GOALS: PEOPLE, IDEAS, TOOLS AND ORGANIZATIONAL EXCELLENCE

The National Science Foundation supports discovery, learning and innovation at the frontiers of science and engineering, where risks and rewards are high, and where benefits to society are most promising. NSF encourages increased and effective collaboration across disciplines and promotes partnerships among academe, industry and government to ensure that new knowledge moves rapidly and smoothly throughout the public and private sectors.

NSF's investment strategy establishes a clear path of progress for achieving four complementary strategic goals: People, Ideas, Tools and Organizational Excellence. "People, Ideas and Tools" is simple shorthand for a sophisticated system that integrates education, research, and cutting-edge infrastructure to create world-class discovery, learning and innovation in science and engineering. Organizational Excellence (OE)—a new NSF strategic goal on a par with the other three—integrates what NSF accomplishes through People, Ideas and Tools with business practices that ensure efficient operations, productive investments and real returns to the American people.

People.—The rapid transformations that new knowledge and technology continuously trigger in our contemporary world make investments in people and learning a continuing focus for NSF. In our knowledge-based economy and society, we need not only scientists and engineers, but also a national workforce with strong skills in science, engineering and mathematics. Yet many of today's students leave secondary school without these skills. Fewer young Americans choose to pursue careers in science and engineering at the university level. Of those that do, fewer than half graduate with science or engineering degrees. The Fiscal Year 2005 Request provides \$1.065 billion for programs that will address these challenges.

To capture the young talent so vital for the next generation of discovery, we will increase the number of fellowships from 5,000 to 5,500 for NSF's flagship graduate education programs: the Integrative Graduate Education and Research Traineeships (IGERT), Graduate Research Fellowships (GRF), and Graduate Teaching Fellows in K-12 Education (GK-12).

Ideas.—New knowledge is the lifeblood of the science and engineering enterprise. Investments in Ideas are aimed at the frontiers of science and engineering. They build the intellectual capital and fundamental knowledge that drive technological innovation, spur economic growth and increase national security. They also seek answers to the most fundamental questions about the origin and nature of the universe, the planet and humankind. Investments totaling \$2.85 billion in fiscal year 2005 will support the best new ideas generated by the science and engineering community.

Increasing grant size and duration is a fundamental, long-term investment priority for NSF. Larger research grants of longer duration will boost the overall productivity of researchers by freeing them to take more risks and focus on more complex research goals with longer time horizons. More flexible timetables will also provide researchers with opportunities to provide expanded education and research experiences to students. Investments in fiscal year 2005 bring NSF average annual research grant award size to approximately \$142,000, an increase of \$3,000 over fiscal year 2004—a 58 percent increase since 1998. Average annual award duration will continue at approximately 3.0 years.

Tools.—The fiscal year 2005 request for Tools totals \$1.47 billion, an increase of \$104 million over the Fiscal Year 2004 Estimate. The increase continues an accelerated program to revitalize and upgrade the Nation's aging infrastructure through broadly distributed investments in instruments and tools. Progress in research and education frequently depends upon the development and use of tools that expand experimental and observational limits. Researchers need access to cutting-edge tools to tackle today's complex and radically different avenues of research, and students who are not trained in their use are at a disadvantage in today's technology-intensive workplace.

Organizational Excellence (OE).—With activities that involve over 200,000 scientists, engineers, educators and students and with over 40,000 proposals to process each year, NSF relies on efficient operations and state-of-the-art business practices to provide quality services and responsible monitoring and stewardship of the agency's investments. NSF's Request includes \$363.05 million to support Organizational

Excellence (OE). This represents an increase in the share of the total NSF budget for OE from 5 percent in fiscal year 2004 to 6 percent in fiscal year 2005.

A number of considerations have elevated the Organizational Excellence portfolio in NSF's Fiscal Year 2005 Request. For 20 years NSF staffing has remained level as the total budget and workload increased significantly, and the work has become more complex. Proposals increasingly involve large, multidisciplinary and interdisciplinary projects and require sophisticated monitoring and evaluation. NSF is also committed to maintaining its traditional high standards for stewardship, innovation and customer service. Key priorities for fiscal year 2005 include award monitoring and oversight, human capital management and IT system improvements necessary for leadership in eGovernment, security upgrades and world-class customer service.

It is central to NSF's mission to provide effective stewardship of public funds, to realize maximum benefits at minimum cost and to ensure public trust in the quality of the process. The fiscal year 2005 investment in Organizational Excellence will streamline and update NSF operations and management by enhancing cutting edge business processes and tools. It will also fund the addition of 25 new permanent employees to address mounting workplace pressure, add new skills to the workforce and improve the quality and responsiveness of customer service.

PRIORITY AREAS

Before providing a few highlights of the budget, it should be noted that the priority-setting process at NSF results from continual consultation with the research community. New programs are added or enhanced only after seeking the combined expertise and experience of the science and engineering community, NSF management and staff, and the National Science Board.

Programs are initiated or enlarged based on considerations of their intellectual merit, broader impacts of the research, the importance to science and engineering, balance across fields and disciplines, and synergy with research in other agencies and nations. NSF coordinates its research with our sister research agencies both informally—by program officers being actively informed of other agencies' programs—and formally, through interagency agreements that spell out the various agency roles in research activities. Moreover, through the Committee of Visitors process there is continuous evaluation and feedback of information about how NSF programs are performing.

Producing the finest scientists and engineers in the world and encouraging new ideas to strengthen U.S. leadership across the frontiers of discovery are NSF's principal goals. NSF puts its money where it counts—94 percent of the budget goes directly to the research and education that keep our knowledge base strong, our economy humming and the benefits to society flowing.

America's science and engineering workforce is the most productive in the world. To keep it that way, we have to attract more of the most promising students to graduate-level studies in science and engineering.

Since its founding in 1950, NSF has supported 39,000 fellows. Next year NSF will increase Fellowships from 5,000 to 5,500 for NSF's prestigious graduate education programs: the Integrative Graduate Education and Research Traineeships (IGERT), Graduate Research Fellowships (GRF), and Graduate Teaching Fellows in K-12 Education (GK-12).

Attracting the Nation's best talent has been facilitated by increasing the level of graduate stipends from a base of \$15,000 in 1999 to \$30,000 in fiscal year 2004. Stipend levels will remain at the \$30,000 level in fiscal year 2005.

Today's science and engineering challenges are more complex. Increasingly, they involve multi-investigator research, as well as a strong emphasis on interdisciplinary research. So, increasing award size and duration—across the board—remains one of NSF's top long-term priorities. In fiscal year 2005 the average annual award will increase by \$3,000. That brings the total increase to 58 percent since 1998.

Opportunities to advance knowledge have never been greater than they are today. NSF invests in emerging areas of research that hold exceptional potential to strengthen U.S. world leadership in areas of global economic and social importance. This year, NSF is requesting funding for five priority areas with very promising research horizons: biocomplexity, nanoscale science and engineering, mathematical sciences, human and social dynamics, and the 21st century workforce.

Biocomplexity in the Environment explores the complex interactions among organisms and their environments at all scales, and through space and time. This fundamental research on the links between ecology, diversity, the evolution of biological systems, and many other factors will help us better understand and, in time, predict

environmental change. In fiscal year 2005, Biocomplexity in the Environment will emphasize research on aquatic systems.

The Human and Social Dynamics priority area will explore a wide range of topics. These include individual decision-making and risk, the dynamics of human behavior, and global agents of change—from democratization, to globalization, to war. Support will also be provided for methodological capabilities in spatial social science and for instrumentation and data resources infrastructure.

Mathematics is the language of science, and is a powerful tool of discovery. The Mathematical Sciences priority areas will focus on fundamental research in the mathematical and statistical sciences, interdisciplinary research connecting math with other fields of science and engineering, and targeted investments in training.

NSF's investment in Nanoscale Science and Engineering targets the fundamental research that underlies nanotechnology—which very likely will be the next “transformational” technology.

Investments in this priority area will emphasize research on nanoscale structures and phenomena, and quantum control. NSF is the lead agency for the government-wide National Nanotechnology Initiative (NNI). NSF is requesting \$305 million, an increase of nearly \$52 million or 20 percent. This is by far NSF's largest priority area investment.

To operate in an increasingly complex world, we have to produce a general workforce that is scientifically and technologically capable, and a science and engineering workforce that is world class by any measure.

The fiscal year 2005 request provides \$20 million to initiate the Workforce for the 21st Century priority area. This investment will support innovations to integrate NSF's investments in education at all levels, from K–12 through postdoctoral, as well as attract more U.S. students to science and engineering fields and broaden participation.

BUDGET HIGHLIGHTS

In fiscal year 2005, NSF will make significant investments in NSF's diverse Centers Programs. Centers bring people, ideas, and tools together on scales that are large enough to have a significant impact on important science and engineering challenges. They provide opportunities to integrate research and education, and to pursue innovative and risky research. An important goal beyond research results is developing leadership in the vision, strategy, and management of the research and education enterprise. The total investment for NSF's Centers Programs is \$457 million, an increase of \$44 million in fiscal year 2005. Here are some highlights of the Centers.

- Thirty million dollars will initiate a new cohort of six Science and Technology Centers. A key feature of these centers is the development of partnerships linking industry, government, and the educational community to improve the transfer of research results, and provide students a full set of boundary-crossing opportunities.
- Twenty million dollars will continue support for multidisciplinary, multi-institutional Science of Learning Centers. These centers are intended to advance understanding of learning through research on the learning process, the context of learning, and learning technologies. The Centers will strengthen the connections between science of learning research and educational and workforce development.
- The budget request provides for two new nanotechnology centers; two or three centers that advance fundamental knowledge about Environmental Social and Behavioral Science; three Information Technology Centers, and additional funding for the NSF Long Term Ecological Research network. An additional \$6 million will fund a number of mathematical and physical science centers, including: Chemistry Centers, Materials Centers, Mathematical Sciences Research Institutes, and Physics Frontiers Centers.

Today, discoveries emerge from around the world. It is essential that American scientists and engineers have opportunities to engage with the world's top researchers, to lead major international collaborations, and to have access to the best research facilities throughout the world and across all the frontiers of science and engineering. The fiscal year 2005 budget to carry out these activities through NSF's Office of International Science and Engineering is \$34 million, an increase of \$6 million, or 21 percent over the fiscal year 2004 estimate.

Finally, NSF will initiate an Innovation Fund at \$5 million. The Fund provides an opportunity for the Foundation to respond quickly to rapidly emerging activities at the frontiers of learning and discovery.

TOOLS—OPENING UP NEW VISTAS

Researchers need access to cutting-edge tools to tackle today's complex and radically different research tasks. If students are not trained in their use, they will be at a disadvantage in today's technology-intensive workplace. The fiscal year 2005 investment in Tools totals \$1½ billion, an increase of \$104 million. This continues an accelerated program to revitalize and upgrade the Nation's aging research infrastructure through investments in cutting-edge tools of every kind.

Nearly \$400 million of the fiscal year 2005 investment supports the expansion of state-of-the-art cyberinfrastructure. New information and communication technologies have transformed the way we do science and engineering. Providing access to moderate-cost computation, storage, analysis, visualization and communication for every researcher will make that work more productive and broaden research perspectives throughout the science and engineering community.

In fiscal year 2005, there are three continuing and three new projects funded by the proposed \$213 million investment in Major Research Equipment and Facilities Construction.

NEON, the National Ecological Observatory Network, is a continental scale research instrument with geographically distributed infrastructure, linked by state-of-the-art networking and communications technology. NEON will facilitate studies that can help us address major environmental challenges and improve our ability to predict environmental change. Funding for NEON planning activities is included in the fiscal year 2004 estimate.

The Scientific Ocean Drilling Vessel is a state-of-the-art drill ship that will be used by the Integrated Ocean Drilling Program (IODP), an international collaboration. Cores of sediment and rock collected from the ocean floor will enhance studies of the geologic processes that modify our planet. Investigators will explore the history of those changes in oceans and climate, and the extent and depth of the planet's biosphere.

The Rare Symmetry Violating Processes (RSVP) includes two highly sensitive experiments to study fundamental symmetries of nature. RSVP will search for the particles or processes that explain the predominance of matter that makes up the observable universe. It will focus on questions ranging from the origins of our physical world to the nature of dark matter.

NSF plans to invest in major research equipment and facilities construction projects over the next several years. We expect to start funding for two additional projects; Ocean Observatories and an Alaska Regional Research Vessel in fiscal year 2006.

In making these critical investments, NSF continues to put a very strong emphasis on effective and efficient management.

CONCLUSION

Mr. Chairman, the budget highlights presented above only begin to touch on the variety and richness of the NSF portfolio. NSF supports research programs to enhance homeland security. This includes the Ecology of Infectious Diseases program, jointly funded with NIH, and the Microbial Genome Sequencing program, jointly funded with the Department of Agriculture. NSF participates on the National Interagency Genome Sequencing Coordinating Committee, where programs have attracted a great deal of interest from the intelligence community, and have been touted as the best. The Critical Infrastructure Protection program, and cybersecurity research and education round out important contributions to enhancing homeland security.

Additionally, as part of the Administration's Climate Change Research Initiative, NSF supports research to reduce uncertainty related to climate variability and change, with the objective of facilitating decision making and informing the policy process.

Mr. Chairman and Members of the Committee, I hope that this brief overview conveys to you the extent of NSF's commitment to advancing science and technology in the national interest. I am aware and appreciative of this subcommittee's long-standing bipartisan support for NSF. I would be happy to respond to any questions that you have.

Senator BOND. Thank you very much, Dr. Bement.
Dr. Washington, welcome. It is good to have you back.

STATEMENT OF WARREN M. WASHINGTON

Dr. WASHINGTON. Chairman Bond, Senator Mikulski, and Senator Johnson, I appreciate the opportunity to testify before you today in my capacity as Chair of the National Science Board.

On behalf of the Board, I thank the subcommittee for its long-term commitment to a broad investment in science, engineering, math, and technology research and education.

As part of the National Science Board's responsibilities, in December, the Board prepared a report to Congress with recommendations for the allocation of the steady and substantial increase in NSF's budget that was authorized as part of the NSF Authorization Act of 2002. The recommendations of this report were provided at a very broad level and assumed the implementation of authorized increase to \$9.8 billion in fiscal year 2007. This funding level will significantly increase NSF's ability to address many unmet needs identified by the Board.

For example, we have over 1,000 excellent rated proposals that cannot be funded, which results in lost opportunities for discovery. While the Board is aware of the current funding realities, we feel strongly that the current positive momentum for significant annual increases to NSF's budget should be maintained. The National Science Board approved the fiscal 2005 budget request that was submitted to OMB and generally supports the budget request before you today. It is a step in the right direction for addressing important national interests identified by Congress.

The Board fully supports the Foundation's integrated portfolio of investments in People, Ideas, Tools, and Organizational Excellence. The strategy, the vision embodied in these four broad areas, provides an effective roadmap for guiding NSF's future. It blends support for the core discipline, with encouragement for interdisciplinary initiatives.

The National Science Board has carefully examined and endorsed five priority areas identified in the fiscal year 2005 request: Bio-complexity in the Environment, Human and Social Dynamics, Mathematical Sciences, Nanoscale Science and Engineering, and Workforce for the Twenty-First Century.

The Board has assessed the current state of the U.S. S&E academic research infrastructure. Our findings and recommendations are published in the "Science and Engineering Infrastructure for the Twenty-First Century: The Role of the National Science Foundation" report. The Board has identified a pressing need to address mid-sized infrastructure projects.

The Board's recent report entitled, "The Science and Engineering Workforce: Realizing America's Potential," underscores that the United States is in a long-distance race to retain its essential global advantage in S&E human resources and sustain our world leadership in science and technology. A high-quality, diverse, and adequately sized workforce that draws on the talents of all of the U.S. demographic groups and on talented international students and professionals, is crucial for maintaining our leadership.

I should point out that there was an article that came out yesterday in the science magazine "Nature", reaffirming our views on this.

PREPARED STATEMENT

Education is a core mission of NSF. The NSF shares in the responsibility for promoting quality math and science education as intertwining objectives in all levels of education across the United States. NSF has the mandate, depth of experience, and well-established relationships to build the partnerships for excellence in education. The Board, therefore, strongly urges continued full funding of the math and science partnerships at NSF. Mr. Chairman, I would like to submit for the record a written statement from the National Science Board "In Support of the Math and Science Partnership Program at NSF". So you have that in your file.

Senator BOND. Thank you very much, Dr. Washington.
[The statement follows:]

PREPARED STATEMENT OF WARREN M. WASHINGTON

Chairman Bond, Senator Mikulski, and Members of the Committee, I appreciate the opportunity to testify before you. I am Warren Washington, Senior Scientist and Section Head of the Climate Change Research Section at the National Center for Atmospheric Research. My testimony today is in my capacity as the Chair of the National Science Board.

On behalf of the National Science Board and the widespread and diverse research and education communities that we all serve, I thank this Committee for its long-term commitment to a broad portfolio of investments in science, mathematics, engineering, and technology research and education.

The Congress established the National Science Board (NSB) in 1950 and gave it dual responsibilities:

- Oversee the activities of, and establish the policies for, the National Science Foundation (NSF); and
- Serve as an independent national science policy body to render advice to the President and the Congress on policy issues related to science and engineering research and education.

As part of this latter responsibility, and as directed by the Congress, the Board prepared "A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation". The report received formal Board approval on December 4, 2003, and has been delivered to the Congress, as well as to the White House Office of Science and Technology Policy and Office of Management and Budget. The purpose of this report was to provide the Congress with recommendations for the allocation of the steady and substantial increase in NSF's budget that was authorized as part of the NSF Act of 2002.

It is important to note that the recommendations of this report were provided at a very broad level and assumed full implementation of the authorized increase in NSF's budget to \$9.8 billion in fiscal year 2007. This funding level will significantly enhance NSF's ability to address many unmet needs identified by the Board. However, the Board is also cognizant of the current realities of the demands on a finite Federal budget. The present Federal budget realities will require the NSF and the Board to adjust the planned budget and programmatic expansion to fit actual yearly increments. Nevertheless, the Board feels strongly that the current positive momentum for annual increases to the NSF budget should be maintained in order to enhance NSF's ability to address these unmet needs, and ensure continued U.S. leadership in the international science, engineering and technology enterprise.

I would like to provide some general comments regarding the NSF fiscal year 2005 budget request, then update you on National Science Board activities over the last year and some of our priorities for the coming year.

2005 BUDGET REQUEST

The National Science Board has reviewed and approved NSF's fiscal year 2005 budget request that was submitted to OMB, and generally supports the budget request before you today. It is a step in the right direction for addressing the important national interests identified by Congress.

The Board fully supports the Foundation's integrated portfolio of investments in People, Ideas, Tools, and Organizational Excellence. The strategic vision embodied in these four broad categories provides an effective roadmap for guiding NSF's future. It thoughtfully blends support for the core disciplines with encouragement for

interdisciplinary initiatives, brings together people from diverse and complementary backgrounds, provides necessary infrastructure for research and science education, and strengthens the Foundation's management of the enterprise.

The National Science Board has carefully examined the five priority areas identified in NSF's fiscal year 2005 budget request: Bio-complexity in the Environment, Human and Social Dynamics, Mathematical Sciences, Nano-scale Science and Engineering, and Workforce for the 21st Century. We wholeheartedly agree that these areas represent the frontier of science and engineering, and hold exceptional promise for new discoveries, educational opportunities, and practical applications.

The Board has assessed the current state of the U.S. S&E academic research infrastructure, examined its role in enabling S&E advances, and identified requirements for a future infrastructure capability. Our findings and recommendations are published in "Science and Engineering Infrastructure for the 21st Century: The Role of the National Science Foundation". A key recommendation is to increase the share of the NSF budget devoted to S&E infrastructure from 22 percent to more like 27 percent in order to provide adequate small- and medium-scale infrastructure and needed investment in cyber-infrastructure. The Board identified a pressing need to address mid-sized infrastructure projects and to develop new funding mechanisms to support them. Funding could potentially be in a number of programs, so that NSF program officers can make decisions between the mid-level infrastructure and next individual or center research grant, based on broader research community input through the merit review process.

The Board's recent report entitled "The Science and Engineering Workforce—Realizing America's Potential" underscores that the United States is in a long-distance race to retain its essential global advantage in S&E human resources and sustain our world leadership in science and technology. A high quality, diverse and adequately sized workforce that draws on the talents of all U.S. demographic groups and talented international students and professionals is crucial to our continued leadership and is a vital Federal responsibility. The Board has concluded that it is a National Imperative for the Federal Government to step forward to ensure the adequacy of the U.S. science and engineering workforce. But the Federal Government cannot act alone. All stakeholders must participate in initiating and mobilizing efforts that increase the number of U.S. citizens pursuing science and engineering studies and careers. At the same time, however, Federal science officials should ensure that international researchers and students continue to feel welcome in the United States and continue their partnerships in the U.S. science and technology enterprise.

Education is a core mission of NSF. NSF not only promotes research, but also shares in the responsibility for promoting quality math and science education as intertwining objectives at all levels of education across the United States. NSF's highly competitive peer-review process is second to none for openly and objectively identifying, reviewing, selecting, funding and providing stewardship for the very best science, technology, engineering and mathematics (STEM) proposals and programs in research and education. NSF has the mandate, depth of experience, and well-established relationships to build the partnerships for excellence in STEM education. The Board, therefore, strongly urges that continued, full funding of the Mathematics and Science Partnerships Program at NSF be sustained over the long term as an essential component of a coordinated Federal effort to promote national excellence in science, mathematics and engineering.

OVERVIEW OF NSB ACTIVITIES DURING THE LAST YEAR

During the last year, the Board has accomplished a great deal in terms of our mission to provide oversight and policy direction to the Foundation. In terms of providing oversight for the Foundation, the Board has:

- Reviewed and endorsed the Office of Inspector General Semi-annual Reports to Congress, and approved NSF management responses,
 - Approved the NSF fiscal year 2005 budget request for transmittal to OMB,
 - Approved the NSF Major Facilities Management and Oversight Guide,
 - Approved the Foundation's Merit Review Report, and
 - Provided review and decisions on 12 major awards or proposal funding requests.
- In terms of providing policy direction to the Foundation, the Board has:
- Issued an official statement on role of NSF in supporting S&E infrastructure (NSB-03-23),
 - Reviewed and approved the NSF Strategic Plan 2003-2008 (August), and
 - Developed a broad set of recommendations for allocation of authorized increases in funding resources to the Foundation.

In terms of advice to the President and the Congress, the Board has:

- Published the Infrastructure Report (NSB-02-190),
- Published the Workforce Report (NSB-03-69),
- Reported on Delegation of Authority in accordance with Section 14 of the NSF Act of 2002.
- Developed and delivered a budget expansion report in accordance with Section 22 of the NSF Act of 2002,
- Prepared and approved the 2004 S&E Indicators Report,
- Provided testimony to Congressional Hearings,
- Interacted with OSTP in meetings and forums on S&E issues, and
- Responded to specific questions and inquiries from Senators and Representatives.

In 2003 the Board meetings and deliberations became much more open in accord with the Sunshine Act. In an effort to facilitate more openness, we:

- Approved new guidelines for attendance at NSB meetings,
- Provided public notice of all our meetings in press releases, the Federal Register and on the NSB website,
- Treated tele-conferences of committees as open meetings,
- Provided much more information to the public in a more timely manner regarding meeting discussions and decisions, and
- Encouraged public comment during the development of Board publications.

I am pleased to report that this new openness has been embraced by Board Members and well received by the press and other members for public. The Office of Inspector General has also just completed their audit of the Board's compliance with the Sunshine Act, and found us fully compliant. We look forward to working with both the Inspector General and the General Counsel to further enhance our procedures and policies in this regard.

During the last year, and especially since August 2003, the Board has made a major effort to increase and improve our outreach and communications with the Congress, other agencies, various interest groups and the outside S&E research and education community.

During 2003 the Board initiated examination of issues related to:

- The process by which Major Research Equipment and Facilities proposals are developed, prioritized and funded,
- NSF policies for Long-lived Data Collections, and
- The identification, development and funding of innovative or high-risk research.

FISCAL YEAR 2005 NSB BUDGET

The administration's Fiscal Year 2005 Budget Request of \$3.95 million for the NSB will be adequate to support Board operations and activities during fiscal year 2005. The request seeks resources to carry out the Board's statutory authority and to strengthen its oversight responsibilities for the Foundation. We expect that the Foundation will continue to provide accounting, logistical and other necessary resources in support of the NSB and its missions, including expert senior S&E staff serving as a cadre of executive secretaries to Board committees and task forces.

At the urging of Congress, in fiscal year 2003 the Board began examining options for augmenting its professional staffing levels. At its May 2003 meeting, the Board decided to begin a process to assess the feasibility of recruiting for positions that would broaden its policy support, provide additional legal advice, and enhance the Board's capabilities in advanced information technology. As an initial step in this process, in August 2003 the Board appointed a new NSB Executive Officer who also serves as the NSB Office Director. At the direction of the Congress, the NSB Executive Officer now reports directly to the NSB Chair. The Board is very pleased with this arrangement.

In October 2003, I notified you, Senator Bond, that I had charged the NSB Executive Officer with identifying options for broadening the NSB Office staff capabilities to better support the broad mission of the NSB. The NSB Office staff provides the independent resources and capabilities for coordinating and implementing S&E policy analyses and development and provides operational support that are essential for the Board to fulfill its mission. By statute, the Board is authorized five professional positions and other clerical staff as necessary. In consultation with the Congress, the Board has defined these professional positions as NSB senior science and engineering policy staff, and the clerical positions as NSB staff that support Board operations and related activities. The full impact of increasing the number of professional positions closer to the statutory level is expected to occur in fiscal year 2005, with increased attention to addressing new skill requirements.

In addition to the NSB Office's essential and independent resources and capabilities, external advisory and assistance services are especially critical to support pro-

duction of NSB reports, and supplement the NSB staff's general research and administration services to the Board. These external services provide the Board and its Office with the flexibility to respond independently, accurately and quickly to requests from Congress and the President, and to address issues raised by the Board itself.

Enhanced Board responsibilities established in the NSF Authorization Act of 2002 and directed by Congressional Report language include: an expanding role in prioritizing and approving Major Research Equipment and Facilities Construction projects; new requirements for meetings open to the public; and responsibilities for reporting on the Foundation's budgetary and programmatic expansion, with specific focus on the projected impact on the science and technology workforce, research infrastructure, size and duration of grants, and underrepresented populations and regions. The National Academies, in response to a Congressional request, recently released a report of their study examining how NSF sets priorities among multiple competing proposals for construction and operation of large-scale research facility projects to support a diverse array of disciplines. Recommendations from this study are being considered with due diligence by the Board as they develop and implement options for meeting their enhanced responsibilities.

The Board will continue to review and approve NSF's actions for creating major NSF programs and funding large projects. Special attention will be paid to budget growth impacts on the S&T workforce, expanded participation in higher education, national S&T infrastructure, and the size and duration of NSF grants.

This year the Board will expand its ongoing examination of its role and responsibilities regarding the NSF's Major Research Equipment and Facilities Construction (MREFC) program. We will factor into this examination the recommendations of the National Academies report on the MREFC program, and develop a process for implementing appropriate modifications to the Board's involvement with the MREFC program. The Board has just received the National Academies report and will comment on it directly to Congress after we have given it careful consideration.

Effective communications and interactions with our constituencies contribute to the Board's work of identifying priority science and technology policy issues, and developing policy advice and recommendation to the President and Congress. To this end, the Board will increase communication and outreach with the university, industry and the broader science and engineering research and education community, Congress, Federal science and technology agencies, and the public. These activities will support U.S. global leadership in discovery and innovation based on a continually expanding and evolving S&T enterprise in this country, and will insure a principal role for NSF programs in providing a critical foundation for science and engineering research and education.

CLOSING REMARKS

The horizon of scientific discovery and engineering achievements stretch far and wide, but are clouded by uncertainty and risk. Experience has shown us that as we reach out to the endless frontier we have realized benefits beyond our dreams. Together, we have confidently faced the uncertainties, boldly accepted the risks, and learned from both our victories and setbacks. But the journey is not short or cheap. It requires careful planning, wise investments, and a long-term commitment.

A STATEMENT OF THE NATIONAL SCIENCE BOARD: IN SUPPORT OF THE MATH AND SCIENCE PARTNERSHIP PROGRAM AT THE NATIONAL SCIENCE FOUNDATION

Education is a core mission of the National Science Foundation (NSF). NSF not only promotes research, but also shares in the responsibility for promoting quality math and science education as intertwining objectives at all levels of education across the United States. NSF's highly competitive peer-review process is second to none for openly and objectively identifying, reviewing, selecting, funding and providing stewardship for the very best science, technology, engineering and mathematics (STEM) proposals and programs in research and education.

Science and mathematics competency is becoming ever more essential to individuals and nations in an increasingly global workforce and economy. STEM education is a special challenge for the highly mobile U.S. population, because it demands a sequential, cumulative acquisition of knowledge and skills. To raise U.S. student performance to a world-class level, all components of the U.S. education system must achieve a consensus on a common core of mathematics and science knowledge and skills. These core competencies must be embedded consistently in instructional

materials and practices everywhere and at all levels, without precluding locally held prerogatives about the content of curricula.¹

The NSF's Math and Science Partnerships (MSPs) are important tools for addressing a critical—but currently very weak—link between pre-college and higher education. This major new national initiative, outlined in NSF's 2002 Authorization Act, has received strong and broad support from Congress and was signed into law by President Bush. It provides for the collaboration between pre-college and college to promote excellence in teaching and learning; therefore facilitating the transitions for students from kindergarten through the baccalaureate in STEM disciplines. The added benefit for our Nation is those students who do not choose STEM careers become the informed scientifically literate voting citizens we need for the 21st Century.

We do not have the luxury of time for further political debate on how to bring our Nation's education system up to a world-class level in science and mathematics—much less to achieve world leadership in these critical competencies.² NSF has the mandate, depth of experience, and well-established relationships to build the partnerships for excellence in STEM education. The Board, therefore, strongly urges that continued, full funding of the MSP Program at NSF be sustained over the long term as an essential component of a coordinated Federal effort to promote national excellence in science, mathematics and engineering.

Senator BOND. All of the written statements will be included in the record as full. We are faced with a projected vote at 11 o'clock. I will keep my first round of questions short, and ask for short answers. If we have a vote at 11 o'clock, we will come back, and I want to have an opportunity for Senator Mikulski and Senator Johnson to ask questions.

CHALLENGE OF SERVING IN DUAL CAPACITIES

First, let me talk about the dual hat you are wearing, Dr. Bement, with the Director of NIST and Acting Director of NSF. I would like to know how you intend to balance the roles in each and what your plans are during your time as Acting Director at NSF.

Dr. BEMENT. Thank you, Senator. The only way anyone could carry on such a prodigious challenge is to have two outstanding deputy directors. And I do have two outstanding deputy directors, Dr. Bordogna at the National Science Foundation, and Dr. Semerjian. Both people are highly talented, highly experienced, and I have known them and worked with them for some time.

You mentioned 40 hours a week. Well, I work more than 40 hours a week, but so does everyone at the National Science Foundation. In fact, our recent study indicates that a large fraction of them work 50 or 60 hours a week, and that is a concern, because—

Senator BOND. We work more than that up here, but you are doing important work.

Dr. BEMENT. The other thing I would say is that I am trying to limit my travel and stick to my knitting. So I will stay very focused.

GOALS AS NEW NSF DIRECTOR

Senator BOND. Yes, but what do you want to do at NSF? I know the time and all that, but do you have any specific objective or objectives?

Dr. BEMENT. Well, I could give you a fuller answer if I had 2 or 3 more days, but—

¹ NSB 98–154, NSB 99–31, <http://www.nsf.gov/nsb/documents>.

² NSB 03–69, <http://www.nsf.gov/nsb/documents>.

Senator BOND. All right. I understand you have——

Dr. BEMENT [continuing]. With the 4 days that I have, I do feel that one of my major priorities is to deal with the staff issues, not only in bringing on highly talented assistant directors, whose positions are being vacated, but also to deal with the internal workload, and furthermore, to facilitate more E-systems within the Foundation.

Senator BOND. I understand that you have only been on board 4 days. Maybe after you have been there for a week or so and some of the discussions we have today, if you would submit——

Dr. BEMENT. I would be glad to. I will have more discussion with you later on, but I am developing an agenda.

Senator BOND. Send us a memo basically on what you think you can do.

[The information follows:]

AGENDA AND GOALS OF ARDEN L. BEMENT, JR.

Since my appointment is acting and expected to be of relatively short duration, my agenda is to focus on the sustainability of current NSF priorities, goals, and research areas as reflected in the fiscal year 2005 budget submission and to address emerging needs of the science, technology, engineering, and mathematics (STEM) communities served by the NSF.

I will also dedicate myself to being a good steward for NSF by focusing on near-term issues and priorities. In particular, I will work closely with the NSB, the Appropriations Committees, and the administration to achieve the following:

- Greater transparency in MREFC management and oversight to include pre-construction planning and assessment, life-cycle budgeting, and cost and management oversight;
- Long-term human-resource planning to assure efficiency and effectiveness of operations, and the further building of a learning organization through training and competence building;
- Sustainable NSF budget levels to pursue the objectives of the NSF Authorization Act of 2002, administration priorities, and the needs and opportunities identified by the STEM communities served by the NSF;
- Continuing close cooperation with the Department of Education to assure that resources flow to math and science teachers under the Math and Science Partnership Initiative to achieve improved student performance in math and science education; and
- Pursuing programs that will increase minority STEM faculty by means of the “Workforce for the 21st Century” priority area and supporting EHR programs. This has been identified by the NSB as being paramount for increasing the numbers of STEM minority students who attain a degree.

SELECTION AND APPOINTMENT OF NEW NSF DIRECTOR

Senator BOND. Dr. Marburger, do you know what the time is for announcing a new director, to allow Dr. Bement to go back to NIST? Do you have any idea on when that is going to work?

Dr. MARBURGER. An aggressive search is underway. Outstanding candidates have been identified and approached. I am very optimistic that we are not talking about very long periods of time. I hesitate to give a deadline, but months would be an appropriate scale.

BALANCE BETWEEN FUNDING FOR PHYSICAL AND LIFE SCIENCES

Senator BOND. That is very good. Maybe, Dr. Marburger, you can tell me, in light of the PCAST report, recommending substantial increases, and as the co-chair of the PCAST, you approved the recommendation. Can you explain why the NSF budget request from OMB is again so inconsistent with the PCAST report? Is there any-

thing you can do to reestablish or to bring some balance between the funding for the life sciences and the physical sciences?

Dr. MARBURGER. Yes, sir. I believe that funding for physical sciences should be a priority, and I believe it is a priority. We are facing a difficult budget situation, and I believe that the 3 percent increase, as meager as it may seem to those used to hearing much larger numbers, is, nevertheless, a very significant signal in this difficult budget period, of the intention and priority that this administration places on this area. If we could find a way to get more in there, I think it would be very good, but I believe this budget does permit the United States to sustain its leadership in these vital areas.

Senator BOND. Thank you, Dr. Marburger.

Senator Mikulski.

Senator MIKULSKI. Thank you very much, Mr. Chairman. I think one of the things Senator Bond and I are concerned about, Dr. Bement, is that you do have two jobs, and because the National Institutes of Standards, NIST, is in my State, we know the extraordinary work that goes on there.

Senator Bond, you might be interested to know, they are doing research on why the World Trade Center collapsed, and not necessarily for forensic purposes, but what will we need to do as we build higher to make sure that buildings are safe, its occupants are safe, that the people who come to do rescue missions would be safe, et cetera. This is a big job. And then for you now to be doing double duty, it is like being in the Marines and the infantry at the same time. It is a little hard.

Dr. BEMENT. Well, at least I have a common mission, in some respects.

Senator MIKULSKI. Yes. Well, we recognize the stress on you. Know that this Senator is very deeply disturbed by the administration's proposed budget of NSF. We believe that it is underfunded. We believe that it resorts to gimmicks, like on the education front, and does not recognize the need in certain key areas. We know that you have been at NSF for 4 days. Know that as I go through this, these are not in any way meant to be prickly in terms of our relationship here.

First of all, I believe that research is short-funded. A 3 percent increase doesn't even meet locality pay standards. Three percent is simply not enough. We could go into that, but one of the areas that is of very keen interest to me, of course, is the field of nanotechnology. That, as we talked about you being the lead agency, the PCAST system, and all that goes on. When I talk about strategic research, again, I am not talking industrial policy, the Euro model, et cetera. But that is what I meant, the best thinking, and then also out in the academic world and even the involvement of the private sector.

ENGAGE PUBLIC IN EMERGING RESEARCH FIELDS

This is not a question. It is a very strong recommendation to the people at NSF. There are those who are raising flashing yellow lights about nanotechnology. I agree with Senator Bond, which is before we get gripped into public controversy, that I would really encourage those working at the coordinating council level, engage

with the critics, and not in a dismissive way. I am not saying that you are in any way like that, Doctor, but unless we understand the validity of their concerns, meet them head on, we get into the genome controversies. We do not want to go there with nanotech. I see it as a cornucopia for our country.

I have lost my steel mills. Will one day we have nano mills making metals that are so strong and light for our automobiles, where we are building automobiles in our country, for whatever our military needs might be, for the trip that we will be taking into space? So let's deal with the critics head on.

MATH AND SCIENCE PARTNERSHIP

We could go over the research money, but also what I am very troubled about is in the area of education. This is where I believe that the administration is really shortchanging us, and also resulting in the gimmicks. I was deeply disturbed about the fact that the administration proposes that this initiative, the Math and Science Partnership initiative, be transferred to the Department of Education.

This was a \$200 million initiative on our part, and the current proposal was to have \$80 million in funds stay at NSF, but to go into research. I know you have been there for 4 days. What this committee would like to know is, and I do not know if you can answer it, but what was the thinking behind it? Was this a budget issue rather than an education issue, because it would be my intent for this year to keep this at NSF while we evaluate what the best way is to stimulate math and science. Do you have any comments on that?

Dr. BEMENT. Senator, I have looked into this matter and I have tried to understand the rationale, but in 4 days, I have not really fully comprehended all the nuances behind the argument. I think the rationale was to take a more integrated approach to have the school districts integrate the types of activities carried under the Math and Science Partnership, and integrate it with some of the block grant support they get from the Department of Education, and for the Department of Education to carry this out on a competitive basis. That is about as far as my understanding goes at the present time.

Senator MIKULSKI. Well, just know that I am very troubled by this, and the fact that the \$80 million they leave behind does not stay in education. It goes into research accounts. That is not to acknowledge the need for the research account. That is my whole point, that the \$80 million that stays behind ought to at least be used in education money, if it goes. I do not want it to go. No Child Left Behind is having a very troubled history now, as it is implemented.

SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS TALENT EXPANSION (TECH TALENT) PROGRAM

Let me go then to the issue of the undergraduate tech talent. This was a program created on a bipartisan basis with Senators Bond, Lieberman, Domenici, Dr. Frist, and myself. We understand that this program has been cut by \$10 million. What would be the consequences to undergraduates with that cut?

Dr. BEMENT. Senator, there were some painful cuts in several educational programs, but I have talked with presidents of degree-granting, Ph.D.-granting HBCU's. I have also had a long-time relationship with the Science and Engineering Alliance. And the understanding I have from them is that they want to build capacity and sustainability in their ability to not only build on the current Ph.D. programs and attract more students from undergraduate ranks into the graduate ranks, but also to expand the number of offerings they have at the Ph.D. level. To do that——

Senator MIKULSKI. So what does the money do? I mean understand our goal here.

Dr. BEMENT. Well, the answer to that is not necessarily in the Education and Human Resources account. It is in the Research and Related Activities account. The amount of funding that is now being provided to minority-serving institutions has been increasing, and it is quite substantial compared with the targeted programs.

Senator MIKULSKI. Well, remember, sir, I am talking about two separate programs. I am concerned that historically black colleges funding has been cut by almost 15 percent. So you can talk about building capacity and all that, if it is cut by 15 percent, regardless of what account it is in, it has been cut.

Then there is the Tech Talent program. As you know, we were trying to get our undergraduates involved in science and math before we even get to the graduate level. That has been cut. That was the Tech Talent. Let us fund it.

Dr. BEMENT. Okay.

Senator MIKULSKI. Let us support it. At NSF, it is referred to as STEP. It was funded at a very modest amount, \$15 million. It was cut to \$10 million. I wonder what are the consequences——

Dr. BEMENT. I understand.

WORKFORCE ISSUES

Senator MIKULSKI [continuing]. To students, and, of course, our long-term national goals. I will go back to the Reagan Commission on Competitiveness. Control your deficits, invest in research and technology, and build the smartest workforce that—like our army, the best army that the military has ever seen, we need to have the best workforce.

Dr. BEMENT. Yes.

Senator MIKULSKI. I do not think we have a workforce shortage. I think we have a skill shortage. If we can meet that——

Dr. BEMENT. Yes. I agree with that. It turns out that many of the jobs that are opening up in the manufacturing sector cannot be filled because there are not the skills.

Senator MIKULSKI. What type of jobs are they, sir?

Dr. BEMENT. Many of these would be operating jobs; with some involving more sophisticated manufacturing equipment, information technology, the ability to make measurements, and quality engineering on the shop floor. These are the types of jobs that require technical training.

ROLE OF COMMUNITY COLLEGES

Senator MIKULSKI. That takes me to another issue, which is community colleges. What a great social invention.

Dr. BEMENT. Yes. We are in violent agreement on that. They are very essential. Very essential.

Senator MIKULSKI. How do you see community colleges fitting in this year's budget request, and in your world, what you would recommend? Dr. Washington, I know you are interested in this topic. For many people, it is the gateway. For some first-time people, some of our new legal immigrants, for people of modest means, or people who are just trying to get started part time, the community college is it. For the mid-career person, the community college, it is the gateway to being able to make it in our society. Where—

Dr. BEMENT. Senator, I know that the administration is very much interested in this issue and is developing a major effort in this area of workforce training, including the community colleges. NIST, for example, has a part to play through our Manufacturing Extension Partnership.

If I were to look into the National Science Foundation budget, I would find that there is probably not as much as we could do. It is something we have to pay attention to.

Senator MIKULSKI. Would you please, again, knowing that you have just been briefed, and we recognize the circumstances, would you please look at this whole focus on making use of not only our traditional academic centers, but of the unique institutions in our country. The community college is one. The historically black colleges are another as well as some of our women's colleges. Looking at them, they are also pools of talent. I hear back home, we have a nursing shortage. We have a lab technician shortage, a radiology technician shortage. I could elaborate, but a 2-year program at a community college could get you right into the marketplace in a very different way than retail sales—

Dr. BEMENT. Yes.

Senator MIKULSKI. I believe all work is honorable, but this could give you the opportunity to pursue a 4-year program later on.

Dr. BEMENT. I think a partial answer to that may come through our Workforce for the Twenty-First Century priority area, which is one of our major initiatives this year. There are two elements of that program that are intended to accomplish much of what you are talking about. One is to better integrate the pipeline so that we can extend the pipeline all the way from K to 12, all the way up through post-doctorate training.

Senator MIKULSKI. Well, I know the vote has started and there are many questions that we could ask. What I would like to know is, what are the consequences of some of these decisions, and then look at what we need to do. One is, of course, this whole transfer to the Department of Education, and \$80 million going into research rather than staying in education.

Second, what can we be doing to look out for our community colleges? This also presumes we are looking out for the land grant colleges, as well as the Ivy League-type schools that are so important.

Dr. Washington, do—

Dr. WASHINGTON. Well, I was just going to say—

Senator BOND. Dr. Washington wanted to add something.

Dr. WASHINGTON. Yes, sir.

Senator BOND. I just wanted to join in here—

Senator MIKULSKI. Good, please.

Senator BOND [continuing]. With Senator Mikulski. I believe, No. 1, you had some questions, Dr. Washington, about the transfer of math and science, and I could not agree more with Senator Mikulski. Also, the emphasis on community colleges. We happen to have an advanced technical center in my home that trains nurses, and they have a new photonics optics laser lab for training people. They do some wonderful things there.

We are going to have to go for a vote in a few minutes, but I wanted to have Dr. Washington have an opportunity to respond to several of these points. I think, Doctor, you had a number of things you might want to add.

Senator MIKULSKI. Good. That is exactly where I was headed. Yes, sir.

Dr. WASHINGTON. Okay. I know that you are very short on time. I will certainly bring your concerns to the full Board for us to take a look at some of the concerns that you have expressed, and especially those dealing with the community colleges. We understand already that we are not putting enough emphasis on the science and math in those schools, so that we will just sort of take a look at that and get back to you.

Senator BOND. Senator Mikulski, do you have—I am going to come back, and—

Senator MIKULSKI. No, Mr. Chairman. I think after the vote, I will try to come back, but I am not sure.

Senator BOND. All right. Well, do you have any other questions that you wish to ask?

INFRASTRUCTURE INVESTMENTS

Senator MIKULSKI. Right now, I have one more for Dr. Washington. This goes to the facilities and the whole size mid-size recommendations. Could you elaborate on why you made that recommendation, so we could grasp that?

Dr. WASHINGTON. Well, I think that we are seeing the investment in infrastructure, especially in terms of equipment, is going to be a more important part of NSF's future. In fact, we have already recommended that the investment be changed from essentially 22 percent up to a 27 percentage. We are also seeing—

Senator MIKULSKI. Why mid-size?

Dr. WASHINGTON. What?

Senator MIKULSKI. Why mid-size?

Dr. WASHINGTON. Well, we are seeing that in addition to the big things that we fund, the telescopes, and the airplanes, and so forth, that there is a great increase in interest by groups of scientists in the mid-range. In other words, things that may cost maybe a few million dollars, up to maybe \$20 million.

Senator MIKULSKI. What would be some examples of that, Dr. Washington?

Dr. WASHINGTON. I think we are seeing augmentation of capability on existing facilities. We are also seeing smaller groups doing, for example, field studies, doing experiments in—

Senator MIKULSKI. So are you talking about research, or are you talking about mid-sized projects and facilities?

Dr. WASHINGTON. Yes. I am talking about research instruments and facilities. In other words, these are things that are not extremely expensive, but they are beyond what you can do——

Senator MIKULSKI. Like Senator Bond talking about that advanced school in technology that is training nurses——

Dr. WASHINGTON. Yes.

Senator MIKULSKI [continuing]. Which would be a mid-size procurement, but for that school, was a pretty big buck investment, given its stresses, am I correct?

Dr. WASHINGTON. They are scraping to try to get the——

Senator MIKULSKI. Right, but in the scheme of things, that would be viewed as mid-size——

Dr. WASHINGTON. Yes.

Senator MIKULSKI [continuing]. But the consequences both to the school, its productivity, in terms of what it can do for students, and then nurses coming out with the latest training, that is the kind of thing you are talking about?

Dr. WASHINGTON. Yes. But it is actually a very broad spectrum, but I think——

Senator MIKULSKI. Oh. I got it.

Dr. WASHINGTON [continuing]. That is an example.

Senator MIKULSKI. I got it. Well, thank you.

CONSOLIDATION OF MATH AND SCIENCE PARTNERSHIP

Senator BOND. Dr. Washington, let me go back to the point that Senator Mikulski raised about the transfer of math and science. I understand the Board disagrees with that. Could you give us briefly the reasons they disagree?

Dr. WASHINGTON. Well, I think it is fundamentally a program that is a partnership between school districts and academic institutions. In that partnership, we feel, through a peer-review system, that we have built an excellent program. It has just gotten started, actually.

The Board did have a lengthy discussion of this and has issued a statement essentially saying that we think it is best if it remains in the National Science Foundation.

Senator BOND. I would wholeheartedly concur with that. I think there are many needs in education. I think it is going to be swallowed up, and it is going to disappear.

Well, with that, I will be back with a number of questions. I am delighted to see Dr. Clutter is here. We will have, as you might guess, some biotechnology questions when I come back.

The hearing will stand adjourned, I hope for no more than about 10 minutes. Thank you very much.

SOUND SCIENCE

Dr. Marburger, I recently saw a group of scientists accusing the administration of systematically distorting scientific facts to manipulate policy goals. I was very concerned to hear these accusations. I believe very strongly that science should be based on facts, not political or partisan, and given the serious nature of these accusations, I think it would be appropriate if you would respond to those, please.

Dr. MARBURGER. Thank you, Mr. Chairman. I am delighted to have an opportunity to address that issue. We did receive a letter statement signed by a number of prominent scientists that made a number of representations. I believe that the incidents that are listed in that document have alternative explanations, and they do not justify the sweeping conclusions of either the document that accompanied the statement, or the statement itself. I believe the document has methodological flaws that undermine its own conclusions, not least of which is the failure to reflect responses or explanations from responsible government officials.

From my personal experience and direct knowledge of the incidents in question, I can state unequivocally that this administration does not have a policy of distorting, manipulating, or managing scientific processes or technical information to suit its policies. President Bush believes that policies should be made with the best and most complete information possible, and he expects his appointees to conduct their business in a way that fulfills that expectation.

I would be glad to give more detail, which would be tedious to go into in this hearing, probably inappropriate, but I do appreciate the opportunity to get it on the record, and I would respond to questions regarding it.

Senator BOND. Dr. Marburger, I think we have more important things to do in this hearing, but I think given the serious nature of the charges, I appreciate your personal affirmation and strong statement. I think that is very important. But for the record, it would be helpful if you would present us with a copy of whatever response you have made to the charges so that they will be available in a public record.

Dr. MARBURGER. Thank you.
[The information follows:]

STATEMENT BY JOHN MARBURGER ON ALLEGATIONS CONTAINED IN A DOCUMENT
RELEASED BY THE UNION OF CONCERNED SCIENTISTS

"I do not agree in any way with the statement or supporting document that were released by the Union of Concerned Scientists. I believe the discussion of the allegations in the document is incomplete, and does not justify the sweeping conclusions of either the document or the accompanying statement. I also believe the document has methodological flaws that undermine its own conclusions, not the least of which is the failure to reflect responses or explanations from responsible government officials.

"President Bush believes policies should be formed with the best and most complete information possible and expects his appointees to conduct their business in a way that fulfills that belief. From my personal experience and direct knowledge, I can state unequivocally that this Administration applies the highest scientific standards in decision-making.

"I look forward to discussing the issues directly with the signatories to help bridge any misunderstandings and disagreements."

Senator BOND. I thank you very much for that.

Dr. MARBURGER. Thank you.

PLANT GENOME RESEARCH

Senator BOND. Now, I want to turn to, not surprisingly, biotechnology. Dr. Marburger, I was pleased to read in the January 2004, National Plant Genome Initiative Progress Report that the Federal Government is expanding its research with scientists in de-

veloping countries. As you know, I have been interested in expanding the plant biotechnology, especially in places in Africa. And I have met with scientific, agricultural, and human health officials from African countries, as well as Southeast Asian countries, who look forward to the opportunities that plant biotechnology will provide them.

We find that much of the opposition, and I believe it is unfounded, unscientific, and based on hysteria, comes in countries where they are well fed. Hungry countries in the world are looking for better technology to provide the food that they need, with less reliance on chemical pesticides. And I believe that the future is bright if we can continue to work with these countries.

Would you give me an overview of the government's work in developing countries and how you plan to deal with the public perception problems that have plagued other countries? I have denoted it as Euro-Sclerosis, and I would appreciate how you may be responding to that particular affliction.

Dr. MARBURGER. Thank you, Mr. Chairman. This is an area where I think the United States has considerable to offer other countries. It certainly comes up in ministerial meetings that I attend with other science ministers from other countries. Within the United States, my office coordinates a very large interagency process to make sure that the United States is effective in all of its interactions with other countries, as well as internally.

There was an interagency working group that was established in 1987, due in large part to the interest of this subcommittee. Since then, we have coordinated the plant genome activities of the National Science Foundation, the U.S. Department of Agriculture, the Department of Energy, and recently expanded to include USAID, which is important to the international component, and NASA. NIH is also an active member of this group, providing member agencies with insights gained through the human genome program, which was also an international program.

This group released its second 5-year plan in January of this year. We still are interested in obtaining additional sequences. It has been very successful, for example, with the rice genome, whose completion was celebrated more than a year ago. But other priorities related to the application of these, as to how do we use them, especially in these developing country situations, are now included in that plan, which I would be glad to make available as part of this record.

This working group that we sponsor just published their annual report in January of this year, this past month, and we will make that part of the record as well.

[CLERK'S NOTE.—The annual report has been retained in committee files.]

Senator BOND. Thank you. I might ask Dr. Clutter if she would come to join us at the table. I would like to ask her to share with us her thoughts and ideas on the National Science Foundation's efforts in expanding the plant genome program to developing countries.

Welcome, Dr. Clutter.

STATEMENT OF MARY E. CLUTTER

Dr. CLUTTER. Thank you very much, Senator Bond. It is always a pleasure to appear before this committee. I think that what I would like to bring up is just sort of a status report on where we are. Not just looking to 2005, but also to 2004. Dr. Marburger has told you about the interagency working group and their work, and it includes all the science agencies. So this year we were joined by NASA and USAID. So there is an opportunity there to put together a very powerful program that will be of benefit to the developing world.

But thinking about 2004, we decided that we would take some of the money in the plant genome program and make it available to scientists at universities in this country who are working with that program, to work with scientists in developing nations. And the goal there is to bring the power of genomics and Twenty-First Century Science to the developing world. We would like to work with scientists there on crops that grow locally, not to introduce some crops that they are not interested in, but to improve the nutritional quality, the resistance to drought, the resistance to disease, to bring those traits to the local crops. So that is starting in 2004.

In 2005, what we want to develop is a joint program, especially involving USAID, to cooperate with the developing world.

Senator BOND. I trust that the cooperation is not limited to universities, that it might include science centers.

Dr. CLUTTER. Absolutely.

DANFORTH PLANT SCIENCE CENTER

Senator BOND. I raise that, because I know that the Danforth Plant Science Center is sending 120 genetically modified casava plants, I believe, to Kenya—

Dr. CLUTTER. That is right.

Senator BOND [continuing]. And they are on the way now to be field tested in a controlled circumstance, and I believe they are looking at other countries which have sought assistance. If we can genetically engineer the indigenous plants so that they are resistant to viruses, other diseases, pests, and in some instances, perhaps more drought tolerant—

Dr. CLUTTER. Exactly.

Senator BOND [continuing]. We will have an opportunity to grow for the people in those countries the vegetables and the other nutrition that they want. So I think that is very important, and I look forward to following that. Do you have any further thoughts on the—

Dr. CLUTTER. I would just like to say that part of what we are doing in 2004 is to support some of the efforts of the Danforth Center. I think they are receiving some supplemental funds to carry out that program with cassava.

Senator BOND. Thank you. That is your judgment, and I am delighted to hear about it. Any other comments on plant biotechnology, genomics?

MANAGEMENT OF LARGE FACILITIES

Well, thank you again for your attention to it.

I want to talk about large research facility management, and I would like to invite Dr. Boesz, NSF's Inspector General, to join us at the table.

Dr. Boesz, your office has identified problems with NSF's large research facility management and other management issues. Could you give us an update on how NSF has responded to the problems, and in your opinion, has NSF made adequate progress in addressing the problems?

STATEMENT OF CHRISTINE C. BOESZ

Dr. BOESZ. Good morning, Senator.

Senator BOND. Good morning.

Dr. BOESZ. It is good to see you again. I will be happy to give you an update. First, with respect to the management of large facilities, and the construction and operation of them. NSF has made some progress. Last June, they were able to bring on board a qualified individual to serve as the deputy in this position, to give some oversight and guidance to the general process. However, the progress has been, in my opinion, and the opinion of my staff, somewhat slow. We are still waiting to get the various modules that flesh out this general guidance that has been developed, and we have received two of these modules in draft, but there are at least maybe about a dozen total that need to be done.

Now, the importance of this is that this is the how-to manual, so that people in the field as well as people within the Foundation will know exactly what to do. So while there has been some progress, there is still a lot of work that remains to be done.

Senator BOND. Are the guidelines or criteria outlined by the NSF and are those good criteria?

Dr. BOESZ. For setting the priorities?

Senator BOND. Yes.

PREPARED STATEMENT

Dr. BOESZ. We actually have—are only beginning to look at that with respect to the Board. We had focused more on the management, cost accounting—

Senator BOND. I see.

Dr. BOESZ [continuing]. Life-cycle costs. I might add that we are waiting, also, from NSF to look at how they are going to track life-cycle costs for both construction and operation. That is a big piece that needs to be done. I think that is important information for the Board in order to help them set their priorities.

[The statement follows:]

PREPARED STATEMENT OF CHRISTINE C. BOESZ

Chairman Bond, Senator Mikulski, and distinguished members of the subcommittee, I am Dr. Christine Boesz, Inspector General at the National Science Foundation (NSF). I appreciate the opportunity to present to you information as you consider NSF's fiscal year 2005 budget request. NSF's work over the past 54 years has had an extraordinary impact on scientific and engineering knowledge, laying the groundwork for technological advances that have shaped our society and fostered the progress needed to secure the Nation's future. Throughout, NSF has maintained

a high level of innovation and dedication to American leadership in the discovery and development of new technologies across the frontiers of science and engineering.

Over the past few decades, however, the nature of the scientific enterprise has changed. Consequently, NSF is faced with new challenges to maintaining its leadership position. My office has and will continue to work closely with NSF management to identify and address issues that are important to the success of the National Science Board and NSF. Last year, I testified before this subcommittee on the most significant issues that pose the greatest challenges for NSF management. This year, you have asked me to provide an update, from my perspective as Inspector General, on the progress being made at NSF to address three of these challenges.

MANAGEMENT OF LARGE INFRASTRUCTURE PROJECTS

Throughout my tenure as Inspector General of NSF, we have considered management of large facility and infrastructure projects to be one of NSF's top management challenges.¹ As you know, NSF has been increasing its investment in large infrastructure projects such as accelerators, telescopes, research vessels and aircraft, supercomputers, digital libraries, and earthquake simulators. Many of these projects are large in scale, require complex instrumentation, and involve partnerships with other Federal agencies, international science organizations, and foreign governments. Some, such as the new South Pole Station, present additional challenges because they are located in harsh and remote environments.

As I testified last year,² the management of these awards is inherently different from the bulk of awards that NSF makes. While oversight of the construction and management of these large facility projects and programs must always be sensitive to the scientific endeavor, it also requires a different management approach. It requires disciplined project management including close attention to meeting deadlines and budget, and working hand-in-hand with scientists, engineers, project managers, and financial analysts. Although NSF does not directly operate or manage these facilities, it is NSF that is ultimately responsible and accountable for their success. Consequently, it is vital that NSF, through disciplined project management, exercise proper stewardship over the public funds invested in these large projects.

In fiscal years 2001 and 2002, my office issued two audit reports on large facilities with findings and recommendations aimed at improving NSF's management of these projects.³ Primarily, our recommendations were aimed at (1) increasing NSF's level of oversight of these projects with particular attention on updating and developing policies and procedures to assist NSF managers in project administration, and (2) ensuring that accurate and complete information on the total costs of major research equipment and facilities is available to decision makers, including the National Science Board, which is responsible for not only approving the funding for these large projects, but also setting the relative priorities for their funding. NSF responded that it would combine its efforts to respond to the recommendations made in these separate audit reports.

During the past year, NSF has made gradual progress towards completing the corrective action plans and has taken steps to address approximately half of the report recommendations. In June 2003, NSF took an important step when it hired a new Deputy Director for Large Facility Projects, and in July the agency issued a "Facilities Management and Oversight Guide".⁴ NSF has also begun to offer Project

¹Memorandum from Christine C. Boesz, Inspector General, National Science Foundation, to Warren Washington, Chairman, National Science Board, and Rita R. Colwell, Director, National Science Foundation (Oct. 17, 2003) [hereinafter 2003 Management Challenges]; Memorandum from Christine C. Boesz, Inspector General, National Science Foundation, to Warren Washington, Chairman, National Science Board, and Rita R. Colwell, Director, National Science Foundation (Dec. 23, 2002) [hereinafter 2002 Management Challenges]; Memorandum from Christine C. Boesz, Inspector General, National Science Foundation, to Eamon M. Kelly, Chairman, National Science Board, and Rita R. Colwell, Director, National Science Foundation (Jan. 30, 2002) [hereinafter 2001 Management Challenges]; Letter from Christine C. Boesz, Inspector General, National Science Foundation, to Senator Fred Thompson, Chairman, Senate Committee on Governmental Affairs (Nov. 30, 2000) [hereinafter 2000 Management Challenges].

²Statement of Dr. Christine Boesz, Inspector General, National Science Foundation, before the U.S. Senate, Committee on Appropriations, Subcommittee on VA, HUD, and Independent Agencies (Apr. 3, 2003).

³Office of Inspector General, National Science Foundation, Audit of the Financial Management of the Gemini Project, Report No. 01-2001 (Dec. 15, 2000); Office of Inspector General, National Science Foundation, Audit of Funding for Major Research Equipment and Facilities, Report No. 02-2007 (May 1, 2002).

⁴National Science Foundation, Facilities Management and Oversight Guide (July 2003) <<http://www.nsf.gov/pubs/ods/getpub.cfm?nsf03049>>.

Management Certificate Programs through the NSF Academy to help program officers improve their skills in managing large facility projects.

However, key recommendations from both of these reports on developing new project and financial management policies and procedures remain unresolved by NSF management. Although NSF has issued a “Facilities Management and Oversight Guide”, this Guide does not provide the detail necessary to provide practical guidance to staff that perform the day-to-day work, nor does it address the problem of recording and tracking the full cost of large facility projects. A systematic process for reporting and tracking both the operational milestones and the associated financial transactions that occur during a project’s lifecycle, particularly those pertaining to changes in scope, is still needed. Finally, staff involved with large facility projects need to be trained on the revised policies and procedures that affect funding, accounting, and monitoring. NSF plans to address these outstanding audit recommendations by providing several additional modules to its “Facilities Management and Oversight Guide” that will address various topics such as risk management and financial accounting. My office was recently provided with drafts of two of these modules and is currently reviewing them to provide feedback to the Deputy Director for Large Facility Projects.

While I am pleased to see that NSF is continuing to make progress toward addressing this important management challenge, I remain concerned with the level of attention afforded this issue by senior NSF management. The responsibility for continuing to make progress in this area has fallen to the Deputy Director for Large Facility Projects who may not have been afforded the necessary resources to complete the detailed modules to the “Facilities Management and Oversight Guide” in a timely manner. Currently, the Deputy needs additional staff to assist with completing these numerous and detailed modules. Also, a system to identify and account for life-cycle costs is needed to support management, as well as the prioritization of projects.

AWARD ADMINISTRATION

In addition to its management of some of its very large awards, another ongoing management challenge at NSF involves general administration of all of its research and education grants and cooperative agreements.⁵ While NSF has a proven system for administering its peer review and award disbursement responsibilities, it still lacks a comprehensive, risk-based program for monitoring its grants and cooperative agreements once the money has been awarded. As a result, there is little assurance that NSF award funds are accurately protected from fraud, waste, abuse, and mismanagement. Recent audits conducted by my office of high-risk awardees, such as foreign organizations and recipients of Urban Systemic Initiative (USI) awards, confirm that in the absence of an effective post-award monitoring program, problems with certain types of grants tend to recur.

In a given year, NSF spends roughly 90 percent of its appropriated funds on awards for research and education activities. In fiscal year 2003, NSF reviewed 40,075 proposals—an increase of 14 percent over fiscal year 2002—in order to fund 10,844 awards.⁶ Given the amount of work required to process an award, NSF is challenged to monitor its \$18.7 billion award portfolio (including all active multi-year awards) for both scientific and educational accomplishment and financial compliance. During the past 3 years, weaknesses in NSF’s internal controls over the financial, administrative, and compliance aspects of post-award management were cited as a reportable condition in the audits of NSF’s financial statements.⁷ What this means is that the bulk of staff effort is placed on moving funds out the door with little attention paid to how those funds are used.

NSF has recognized the need to create a risk-based award-monitoring program and has begun to address this issue. The agency has developed a “Risk Assessment and Award Monitoring Guide” that includes post-award monitoring policies and procedures, a systematic risk assessment process for classifying high-risk grantees, and various grantee analysis techniques. During the past year, NSF has made some progress towards fully addressing this management challenge and responding to audit recommendations. For instance, NSF issued the “Award Monitoring and Busi-

⁵ 2003 Management Challenges; 2002 Management Challenges; 2001 Management Challenges; 2000 Management Challenges, *supra* note 1.

⁶ National Science Foundation, Fiscal Year 2003 Performance and Accountability Report (Nov. 2003) <http://www.nsf.gov/pubs/2004/nsf0410/new_pdf/nsf0410final.pdf>.

⁷ Auditor’s Report, Fiscal Year 2003 National Science Foundation Financial Statement Audit (Nov. 17, 2003); Auditor’s Report, Fiscal Year 2002 National Science Foundation Financial Statement Audit (Jan. 29, 2003); Auditor’s Report, Fiscal Year 2001 National Science Foundation Financial Statement Audit (Jan. 18, 2002).

ness Assistance Program Guide”, developed an annual grantee-monitoring plan, conducted 32 site visits on selected grantees, and provided grant-monitoring training for its reviewers.

While these efforts represent good first steps toward an effective award-monitoring program, weaknesses still exist and there are inconsistencies with its implementation. For example, the criteria developed for identifying high-risk grantees is not comprehensive and does not include all potential risk characteristics such as a history of poor programmatic or financial performance. Further, the program does not address medium and low-risk awards, for which NSF could implement a lesser degree of oversight at a minimal cost. Finally, the site visits that are being conducted do not necessarily follow consistent policies and protocols, are not adequately documented, and may not be followed-up on by NSF staff to ensure that corrective actions are taken in response to site visit recommendations.

STRATEGIC MANAGEMENT OF HUMAN CAPITAL

While the previous two management challenges are of an urgent nature, they may be symptomatic of a larger more pressing need for improved strategic management of NSF’s human capital. In order to fully address its award management challenges, NSF will need to devote more resources and attention to making business and process improvements, while at the same time, planning for its current and future workforce needs. Although advances in technology have enhanced the workforce’s productivity, NSF’s rapidly increasing workload has forced the agency to become increasingly dependent on temporary staff and contractors to handle the additional work. NSF’s efforts in the past to justify an increase in staff have been impeded by the lack of a comprehensive workforce plan that identifies workforce gaps and outlines specific actions for addressing them. Without such a plan, NSF cannot determine whether it has the appropriate number of people and competencies to accomplish its strategic goals.

NSF has recognized the seriousness of this challenge and has now identified investment in human capital and business processes, along with technologies and tools, as objectives underlying its new Organizational Excellence strategic goal.⁸ NSF also contracted in fiscal year 2002 for a comprehensive, \$14.8 million, 3- to 4-year business analysis, which includes a component that includes a Human Capital Workforce Plan (HCMP). Preliminary assessments provided by the contractor confirm that NSF’s current workforce planning activities have been limited and identify that specific opportunities for NSF exist in this area.

Currently, the HCMP is a preliminary effort to develop a process for identifying and managing human capital needs and contains few specific recommendations that will have a near-term impact. In addition, the HCMP provides little in the way of milestones and accountability for the accomplishment of these early steps. According to that project schedule, it will be more than a year before the HCMP will identify the specific gaps that NSF needs for justifying budget requests for additional staff resources. I believe NSF faces an urgency with its workforce issues. If not adequately addressed, these issues will undermine NSF’s efforts to confront its other pressing management challenges and to achieve its strategic goal of Organizational Excellence.

Chairman Bond, this concludes my written statement. I would be happy to answer any additional questions you or other members of the subcommittee may have, or to elaborate on any of the issues that I have addressed today.

Senator BOND. Dr. Bement, obviously, with 4 days of experience, you were talking about responding. I will gather this is one of the areas you are going to be looking at. Would you care to respond any further on that?

Dr. BEMENT. Well, you asked me previously what my agenda would be, and when you see my agenda, this will be high on the list.

Senator BOND. Thank you.

Dr. BEMENT. I have read the NRC report. I find that many of the high-level recommendations are sensible, and things that we have not really waited on to begin implementing. Mark Coles, who is the Deputy Director for Large Facilities, is already hard at work at

⁸National Science Foundation, Strategic Plan Fiscal Year 2003–Fiscal Year 2008 (Sept. 30, 2003) <http://www.nsf.gov/od/gpra/Strategic_Plan/FY2003-2008.pdf>.

that, but we are still developing our full response. And I intend to work with the National Science Board in responding to the NRC, and also to the Committee on how we are going to go forward with the recommendations.

NANOSCALE SCIENCE AND ENGINEERING

Senator BOND. Thank you, sir. Thank you, Dr. Boesz. We talked about nanotechnology. As Senator Mikulski and I both noted, we think that nanotechnology is extremely important, and NSF has the unique role of being the lead agency in the initiative, with a funding request of \$305 million. There is a lot of excitement about it because of the potential of far-reaching benefits, but there is a growing public concern about this technology that has to be addressed. I would like to ask what are your plans for the funds, and how are you addressing educating the public about nanotechnology. Maybe I will start first with Dr. Marburger, because he has been on this case for a while.

Dr. MARBURGER. Thank you, Mr. Chairman. In fact, the strong intention of the National Nanotechnology Initiative is to focus appropriately on social, environmental, and health impacts of nanotechnology. There was a workshop last winter, I believe it was in December, that focused on this issue and had many papers by people who had studied the issues. And I came away looking at the results of that workshop with the impression that this issue is being taken very seriously by the program.

Appropriate levels of investments are being made to understand the social impacts of nanotechnology. But more importantly, I believe foundations for good framework for appropriate regulation and response to the potential hazards of nano materials exists and can be tuned up and modified to accommodate the needs of this emerging, exciting new technology.

So I believe we are in a position to address in an appropriate way, with appropriate level of resources. I am very pleased at the visibility that social and environmental impacts have within the NSF's leadership of the program.

Senator BOND. Dr. Bement, I would like you to comment on that, and then——

Dr. BEMENT. Yes.

Senator BOND. Obviously, you have to have the good science first, and how do you go about addressing the public concerns? That is what we would like to know, how do you intend to——

Dr. BEMENT. Well, first of all, we are addressing this problem head on, as you recommended and as Senator Mikulski advocated, and we are taking it very seriously. We want to be ahead of the issue.

We have a significant fraction of our investment in Nanoscale Science and Engineering, which is focused on societal and educational implications of nanotechnology. About \$25 million of our budget is focused in that area. But I think also in the new focused initiative of Human and Social Dynamics and how society copes with change, there are opportunities there also to try and understand what the social implications are. So we are going to give this very serious attention.

Senator BOND. How do you intend to publicize your findings? How do you intend to reach the public with this good information?

Dr. BEMENT. Well, I do not want to go into all the mechanics, but—

Senator BOND. I just want the big picture. There are a lot of people who can do mechanics, and I do not do those well.

Dr. BEMENT. Clearly, one way we communicate with the community at large is through our website. But we have many ways of doing op-ed pieces and communicating our science results, by putting it in context with the general public. We will use all those means.

Senator BOND. Has anybody ever invited you to be on TV talk shows?

Dr. BEMENT. Periodically, yes.

Senator BOND. Dr. Marburger?

Dr. MARBURGER. I would like to say a word about that. The fact that funds have been allocated and appropriated for the specific purpose of addressing this issue in a scholarly way really mobilizes the intellectual community in this country and kind of puts this issue out into the marketplace in a way that is guaranteed to generate interest and attention.

I believe that engaging the science community and the intellectual community of the United States in a constructive way through programs, through the National Nanotechnology Initiative, and particularly through the National Science Foundation, will raise the visibility, not only of the issues, but of how we can go about addressing them and solving them. I think the investment in funded programs through the National Science Foundation particularly will help—will automatically generate a great deal of public interest.

Senator BOND. I think you are going to have to be proactive on it. You have science education centers and partnerships, which I think, obviously, are going to have to be used. And you are going to have to look for opportunities to take on controversy. Controversy is not bad. That is how we focus. Take it on, get involved in the discussions. And if you do not get involved in the controversy, you are not going to get your point across, and controversy probably gives you an opportunity to get more coverage than you would. If it was plain vanilla and all good and low carbs, you would not have any action with it.

Dr. Marburger, I am going to ask you a question, an OSTP question not related to the NSF. The Veterans Administration has expressed concerns about receiving a fair reimbursement from NIH for conducting NIH-sponsored research. We are concerned about this on this committee, because under current practice, research facility costs are paid out of VA's medical care account instead of receiving indirect cost reimbursement for NIH. We asked OSTP to review the issue, and I wondered if you could give us a status report on that review.

Dr. MARBURGER. Yes, sir. We have reviewed the issue. I am just looking for my notes on that. I believe there is a reference to it in my written testimony. In my written testimony and even in my oral testimony, I did mention that the VA will soon begin to use

increased funding from private companies for the indirect administration costs of conducting research in VA facilities.

So once we started thinking about how to deal with the specific relationship between the National Institutes of Health and the Veterans Administration, we decided that we needed to look government-wide to understand the various relationships that exist between Federal intramural scientists and extramural funding programs. There is a generic issue here that affects more than the program in which you expressed interest.

We have an arrangement with an FFRDC, Federally Financed Research and Development Corporation, to conduct studies for us. We commissioned the IDA Science and Technology Policy Institute to assist us in this effort. And they provided us with a preliminary analysis which I would be happy to provide to you, focusing on whether extramural funding agencies, including NIH, support Federal scientists in an appropriate way. There are lots of variations from agency to agency, and we are currently looking at details of how indirect costs are handled, how salaries are covered, and so forth.

[The information follows:]

Intra-Government Policies for S&T Funding

Briefing

for

Kathie L. Olsen, PhD

Associate Director

Office of Science and Technology Policy

By

Pamela Ebert Flattau, PhD

February 13, 2004
Task Order OSTP-20-0001.08



Intra-Government S&T Funding Policies 

Objective:

Define Federal policies and practices that limit or govern the financial relationship between

- intramural investigators
- and
- Federal extramural funding agencies

Intra-Government S&T Funding Policies 

Key Questions:

1. *Do these 6 Federal agencies – directly or indirectly – permit scientists from other Federal agencies to compete for extramural research support?*
 - *“Directly” means as employees of a Federal agency*
 - *“Indirectly” means as employees of a non-Federal organization, such as adjunct faculty at a university or as Co-Principal Investigators*
2. *Do these 6 Federal agencies permit their own intramural scientists to apply for extramural research support from other Federal agencies?*
 - *Are intramural scientists allowed to apply for extramural research funds at their own agency?*

Intra-Government S&T Funding Policies



Approach:

- o Compile a list of top 6 Federal research agencies
- o Conduct web-based review of agency research funding policies and practices
- o Refine search strategy
- o Conduct interviews with key informants
- o Summarize observations by agency and across agencies
- o Invite review of draft materials by key agency staff

Intra-Government S&T Funding Policies



Six key Federal research agencies:

- *Department of Health and Human Services (NIH)*
- *Department of Defense (DoD)*
- *National Aeronautics and Space Administration (NASA)*
- *Department of Energy (DoE)*
- *National Science Foundation (NSF)*
- *US Department of Agriculture (USDA)*

Intra-Government S&T Funding Policies



Some funding concepts:

F&A costs (Facilities and

Administrative): reimbursement for expenses already incurred, such as services of accounting staff and research administrators, utilities for research space, communications infrastructure, etc.

CRADA (Cooperative Research and Development Agreement): a mechanism to promote joint public/ private research and development; established by the Federal Technology Transfer Act of 1986.

MOA/MOU (Memorandum of Agreement/Understanding): formal interagency or similar agreement that specifies the parameters of funding and level of effort during jointly sponsored research.

ITF (Interagency Transfer of Funds): mechanism of support apart from contracts, grants or other instruments; typically does not restrict the types of costs that may be charged.

Intra-Government S&T Funding Policies



General Observations:

- ✓ Agencies *vary* with respect to the permeability of intramural-extramural research funding boundaries
- ✓ Agencies are more likely *to restrict* to whom they give extramural support *than place restrictions* on their intramural scientists
- ✓ Where boundaries are open, *few Federal intramural scientists* seem to take advantage of extramural research funding opportunities
 - ✓ *Most likely owing to disincentives inherent in extramural funding practices*

**General Format
for the Agency-by-Agency Review that Follows**

- Authority for extramural research policy
- Authority for intramural practices
- Extramural research opportunities and policies: general findings
- Agency guidelines for their own intramural scientists: general findings

National Institutes of Health

- **Extramural Authority:** *Public Health Service Act (1912)*
- **Intramural Practices:** *Office of the Director, NIH*
- **Over \$23 billion annually, about 10% intramural**
- **Extramural research opportunities:**
 - Federal institutions are eligible to apply for NIH grants
 - F&A costs will not be provided to Federal institutions
 - PHS segments granted support under exceptional circumstances only
 - Restricts salary payments
 - E.g. may pay difference between VA PT salary and VANPC FT commitment
- **Intramural guidelines for staff:**
 - Permits acceptance of extramural research grants on a case by case basis
 - E.g. DOD funds for breast cancer research
 - Acceptance of outside awards must be approved by Deputy Ethics Counselor
 - NIH staff may not apply for NIH extramural support

Intra-Government S&T Funding Policies



Department of Defense: Research

- **Extramural Authority:** *Primarily 10 U.S.C. 2358*
- **Intramural Practices:** *Director, DDR&E*
- **Over \$3 billion annually, basic and applied**
 - Not including ATD or other RDTE programs
 - NRL is about 13% of in-house basic and applied research
 - *And 17% of non-DOD R&D funding to DOD laboratories*
- **Extramural research opportunities:**
 - Will fund inter-agency applications
 - Typically sent by interagency transfer to other federal agency
 - Allows proposed types of costs to extent reasonable
- **Intramural guidelines for staff:**
 - Permits acceptance of extramural research support
 - No formal guidance
 - Proposed costs may include salary and overhead
 - DOD intramural staff may apply for DOD extramural research support

Intra-Government S&T Funding Policies



National Aeronautics and Space Administration

- **Extramural Authority:** *National Aeronautics and Space Act of 1958*
- **Intramural Practices:** *Office of the Director, NASA*
- **Over \$1.8 billion annually for science, mostly extramural**
- **Extramural research opportunities in science:**
 - Will fund inter-agency applications
 - Any non-NASA US Federal Executive agency or FFRDC sponsored by a Federal agency
 - If a PI proposes to team with/use a US government facility (including NASA Centers/JPL), NASA will execute an inter- or intra-agency transfer of funds to cover applicable government costs
- **Intramural guidelines for staff:**
 - Permits acceptance of extramural research grants
 - NASA employees are permitted to apply for NASA extramural research funds
 - NASA employees are expected to use cost accounting standards authorized by their Centers
 - No salary or overhead support

Intra-Government S&T Funding Policies



Department of Energy: Office of Science

- **Extramural Authority:** Atomic Energy Act of 1942
- **Intramural Practices:** Office of the Director
- **About \$3.2 billion annually, about 50% “extramural”**
 - About \$710 million for university-based research (FY2001)
 - About \$790 million for DOE National Laboratories (GOCO's) (FY2001)
- **“Extramural” research opportunities:**
 - Federal agencies are not eligible to submit applications in response to solicitations
 - Federal agencies may submit grant unsolicited proposals
- **Intramural guidelines for staff:**
 - Not applicable
 - GOCO's

Intra-Government S&T Funding Policies



Department of Energy: Fossil Energy

- **Extramural Authority:** Energy Policy and Conservation Act of 1975
- **Intramural Practices:** Office of the Director
- **About \$600 million annually**
- **Extramural research opportunities:**
 - Will fund applications from other agencies
 - DOE will fund other agency work through interagency agreements
 - “...the proposed effort must not place them in direct competition with the private sector.”
- **Intramural guidelines for staff:**
 - Permits acceptance of extramural research awards
 - E.g., Clean Water in-house research at NETL is funded in part by EPA Region III
 - Encourages use of CRADA's

Intra-Government S&T Funding Policies



Department of Energy: Energy Efficiency and Renewable Energy

- **Extramural Authority:** *Pertinent energy conservation legislation*
- **Intramural Practices:** *Office of the Director*
- **About \$800 million annually (undergoing “extreme makeover”)**
- **Extramural research opportunities:**
 - Will not fund applications from most Federal agencies
 - Will fund applications from DOE National Laboratories
- **Intramural guidelines for staff:**
 - Seems to encourage CRADA's

Intra-Government S&T Funding Policies



Department of Energy: Nuclear Energy, Science and Technology

- **Extramural Authority:** *National energy policy*
- **Intramural Practices:** *Office of the Director*
- **About \$127 million annually**
- **Extramural research opportunities:**
 - Will not fund applications from most Federal agencies
 - Will fund applications from DOE National Laboratories
- **Intramural guidelines for staff:**
 - May compete for such funds as Nuclear Energy Research Initiative

Intra-Government S&T Funding Policies



National Science Foundation

- **Extramural Authority:** *National Science Foundation Act of 1950*
- **Intramural Practices:** *not applicable*
- **Over \$4 billion annually**
- **Extramural research opportunities:**
 - Does not normally fund applications from other federal scientists
 - Will fund federal scientists having joint appointments with a university on a competitive basis
 - Will fund "unusual circumstances"
 - MOU: DoD in materials science and workforce production
 - MOU: NIH in biotechnology
 - MOU: DoE for high-end computing
 - MOU: Dept. of Commerce on Global Climate Change issues
- **Intramural guidelines for staff:**
 - *Not applicable*

Intra-Government S&T Funding Policies



US Department of Agriculture

- **Extramural Authority:** *Hatch Act of 1887; ARS Act of 1946*
- **Intramural Practices:** *Agricultural Research Service (ARS)*
- **Over \$2 billion annually**
 - About \$1.3 billion for ARS and \$1.1 billion for CSREES which includes \$166 million for the National Research Initiative (NRI)
- **Extramural research opportunities:**
 - Will fund inter-agency applications
 - Federal agencies are eligible, esp. for larger grant programs
 - USDA ARS scientists can compete for CSREES funding
 - Legislative cap on indirect cost recovery (major disincentive)
- **Intramural guidelines for staff:**
 - Permits acceptance of extramural research grants
 - Although salary may not be fully recovered
 - ARS intramural scientists may apply for CSREES research funding

Intra-Government S&T Funding Policies



Agency	Supports research by scientists from other federal agencies		Allows their intramural scientists to apply for support	
	Directly	Indirectly	From other agencies	From their own agency
NIH ¹	Yes	Yes	Yes	Yes
DOD ²	Yes	Yes	Yes	Yes
NASA ³	Yes	Yes	Yes	Yes
DOE: Science ⁴	Yes	Yes	No	No
DOE: Fossil Energy ⁵	Yes	Yes	Yes	Yes
DOE: Renewable Energy ⁶	Yes	Yes	Yes	Yes
DOE: Nuclear Energy ⁷	Yes	Yes	Yes	Yes
NSF ⁸	Yes	Yes	No	No
USDA ⁹	Yes	Yes	Yes	Yes

KEY

- Yes
- No
- With restrictions
- National laboratories (GOGO's)
- Not applicable

Intra-Government S&T Funding Policies



¹ NIH: NIH Grants Policy Statement, Part II:
http://grants2.nih.gov/grants/policy/nihpops_2003/NIHQPS_Part13.htm
 Conversations with NIH/OD staff: N. Ruiz-Bravo; C. Alderson; M. Gottesman, J. Schwartz; A. Dempsey and input from P. Chen.

² DoD: Conversations with R. Foster and M. Herbst.

³ NASA: NASA Guidebook for Proposers
<http://www.hq.nasa.gov/office/proposal/procurement/naaguidebook/proposal2003.doc>
 NASA Science Policy:
http://media3.sps.nasa.gov/data/du/cn7/memo_00-08_PD_1989_001A_8page_nasmain
 Conversations with M. Montrose and J. David Bonlin.

⁴ DOE Office of Science: DOE Office of Science Grant Application Guide
<http://www.sc.doe.gov/grants/aga.html>

⁵ DOE Office of Fossil Energy: "Doing Business"
<http://www.fe.doe.gov/business/>

⁶ Office of Renewable Energy:
http://www.doe.gov/budget/content.do?BT_CODE=ENERGYEFFICIENCY

⁷ DOE Office of Nuclear Energy: <http://nenr.ne.doe.gov>

⁸ NSF Grant Proposal Guide:
<http://www.nsf.gov/pubs/2004/nsf04211.htm>
 and conversations with N. Pitts; D. Brzokovic.

⁹ USDA: CSREES General terms and conditions:
<http://www.reasda.gov/crpa/nap/termsa.doc>
 Conversation with C. Heffernan.

Lingering Issues:

- DoD appears to have multiple models for funding research by other federal agencies – do cost principles vary as well?
- Are there restrictions in NASA extramural research support for other Federal scientists?
- Why do some DoE extramural program prohibit applications from some Federal agencies and not others?
- Are USDA intramural scientists (ARS) able to separate themselves meaningful from USDA work when they conduct research funded by other Federal agencies?

Some thoughts on refining the analysis:

- Examine role of funding mechanisms in intra-government S&T funding
- Analyze actual patterns of intra- and inter-agency research funding
 - Changes over time
- Expand analysis to include next tier of Federal research agencies

Dr. MARBURGER. Our hope is that this analysis will be completed soon and that we will be able to approach this specific situation regarding NIH and VA in a context of an overall solution for all the

agencies. This question stimulated a very important analysis that I think will help us to address these issues across government.

Senator BOND. I appreciate that. I have looked at the comments in your written statement about funding from private companies and would appreciate it if your office could get back to us on the NIH funding, which I think definitely is a concern for us.

Dr. MARBURGER. Will do.

HOMESTAKE MINE

Senator BOND. I have a number of other questions for the record, but one thing that had been brought up earlier is the proposal for the NSF to invest in the transformation of Homestake Mine, in Lead, South Dakota, into a neutrino lab. I understand that there are already a number of world-class labs and that NSF is currently spending some \$300 million on Ice Cube, a neutrino lab currently under construction, appropriately at the South Pole.

I would ask Dr. Marburger, I do not know if Dr. Bement had an opportunity to look at it, but either Dr. Marburger or Dr. Washington to comment on the Homestake proposal.

Dr. MARBURGER. My comment on this is going to be really to praise the National Science Foundation for taking steps to look carefully into the technical considerations associated with this site.

We agree that the area of science involved is an important one, that the United States has shown leadership in this area in the past, that there are other major investments by other countries, particularly Japan, in this field of science, and that we hope that the United States continuing participation in this important field can be taken into context of international cooperation.

That said, we believe that the course of the NSF management in this area is an appropriate one. We are aware that some actions have been taken in the recent past regarding the Homestake Mine, and we are watching that situation carefully. But we believe it is up to NSF to decide, using the best science available to it.

Senator BOND. Dr. Bement, have you had an opportunity to look into this question?

Dr. BEMENT. I have, but I do not have a complete answer for you. I do know, however, that there have been several proposals, Homestake being one of them. Many of these, well, all these proposals have been unsolicited, but they have not been fully evaluated by the science community. And there are science communities other than the neutrino—those interested in neutrino detection that are interested in a deep underground research facility.

To go to your one question, "Why a facility like Homestake, compared with other neutrino facilities around the world?" The one capability that is needed is to have enough overburden, or to be deep enough, if you will, or to have enough mass above you that it will screen out cosmic rays so that it will enhance the opportunity to measure neutrinos. Each of the sites that have been proposed has different advantages and disadvantages, and those are going to be reviewed by the science community to develop their requirements for the facility.

Senator BOND. Dr. Washington.

Dr. WASHINGTON. Well, it has not been brought to the Board yet, and we are expecting that the Foundation will carry on its analysis

of the various options, and then present them to the Board. It has not been brought to the Board yet.

Senator BOND. I very much appreciate that. We will look forward to receiving the information when you have developed it. That will be very important for us.

ADDITIONAL COMMITTEE QUESTIONS

I have, as I said, a number of other questions that I will submit for the record. We have already discussed some. We welcome you, Dr. Bement.

Dr. BEMENT. Thank you very much.

Senator BOND. There is nothing like jump-starting your service on the NSF.

Dr. BEMENT. Well, it focuses the mind.

Senator BOND. Senator Mikulski and I have some very strong views, and we are united in those views. I think you may have gathered that. Dr. Marburger, I always appreciate it. Dr. Washington.

[The following questions were not asked at the hearing, but were submitted to the agencies for response subsequent to the hearing:]

QUESTIONS SUBMITTED TO THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY

QUESTIONS SUBMITTED BY SENATOR CHRISTOPHER S. BOND

Question. Due to the perceived subjectivity of NSF's priority-setting process for large research facilities, there has been an increased effort by various scientific interest groups to lobby the Congress on their specific project. In response to this concern, we asked the National Academy of Sciences to develop criteria to rank and prioritize large research facilities and they have responded.

Do you support the Academy study?

Answer. Yes. The National Academies study on the criteria used to rank and prioritize large research facilities is well conceived and, when fully implemented, will bring a high level of transparency and integrity to the process.

Question. When will you be able to provide the Committee with a prioritization of all the current, and proposed, activities in the MREFC account fiscal year 2005?

Answer. It is unlikely that a new prioritization of the Major Research Equipment and Facilities Construction (MREFC) account proposals based upon the National Academies study could be completed in time to affect the fiscal year 2005 appropriations process. The National Academies report requires several elements to be in place that will take some time to complete. In particular, the report stresses that as its basis for its annual budget request, the National Science Foundation (NSF), with approval from the National Science Board, should use a facilities roadmap. The development of a roadmap for NSF facilities represents a significant undertaking that should not be rushed to completion for the purposes of a single budget year's request. The development of a credible scientific facilities roadmap will require broad input from the scientific community to serve as its intellectual basis.

Question. How long will it take NSF and the National Science Board to implement the recommendations?

Answer. The NSF has begun, in earnest, to look at the recommendations of the NAS and has begun to understand how this will impact its process, and there is much work to do. For example, the NSB will need to undertake the development of a facilities roadmap which is a significant undertaking. It is certainly possible that the new process will impact the fiscal year 2006 budget formulation process.

Question. In the budget request for this year, there is a proposal to move Math and Science Partnerships to the Department of Education, and to take the current program obligations and move them into the research account. Can you please explain the rationale behind moving the program away from NSF as well as the transfer of the program into the integrative activities portion of the research account?

Answer. The consolidation of the Math and Science Partnerships (MSP) program at the Department of Education is motivated by a desire to focus the program on integrating research-proven practices into classroom settings. The consolidated program will concentrate attention and resources in a single program for maximum

benefit. The increase in the Department of Education's MSP program is a key component of the President's Jobs for the 21st Century Initiative. President Bush is committed to helping better prepare high school students to enter higher education or the workforce. This initiative is especially important at a time when 80 percent of the fastest-growing jobs in the United States require higher education and many require math and science skills. Moving the management of the ongoing awards to the NSF Director's office is intended to maximize the coordination of NSF-funded MSP awards across NSF and with the consolidated program at Education. The Department of Education and the National Science Foundation will work together to focus ongoing NSF efforts in directions that will benefit the program's shift in emphasis.

Question. As I mentioned in my statement, the program for Informal Science Education is nationally recognized, and exposes millions of children and adults to science and science education. This is an excellent tool for NSF to use to encourage science literacy within the country, and can inspire kids to pursue science in education and as careers. With this in mind, why is Informal Science Education receiving a decrease of 25 percent from the \$62.5 million that we provided in fiscal year 2004?

Answer. The funding for Informal Science Education (ISE) activities at NSF is at the same level as the fiscal year 2004 request. At a time of increasing budgetary pressures, difficult decisions and priorities must be set. It is important to note, however, that outreach and educational activities that occur outside of the classroom are not restricted to the ISE program. All of the major center activities funded by NSF have as part of their responsibilities, outreach activities and onsite educational efforts to explain the science to the public. The impact of informal educational activities is not completely captured by looking only at those supported under the ISE budget line, and NSF continues to emphasize the value of having the research community itself directly engaged in informal science educational activities.

Question. An ongoing concern of Congress is the need for making sure that we have enough college students with majors in science, engineering, and technology fields. Congress has consistently shown support for this program, despite the annual cutting of the budget for this program by the administration. Why is NSF, once again, cutting Tech Talent by \$10 million, a 66 percent decrease?

What are your views of NSF, the National Science Board, and OSTP, on the benefits of the Tech Talent program? Do you believe, as Congress does, that there is a strong need for this program?

Answer. The administration strongly supports expanded opportunities to obtain technical training and education. In fact, the President's fiscal year 2005 budget request proposes several new programs and expands others to better prepare workers for jobs in the new millennium, by strengthening secondary education and job training. The President's budget calls for increased access to post-secondary education and job training through community-based job training grants (\$250 million) and enhanced Pell Grants (\$33 million) for certain low-income students. In addition, the President's plan calls for increases in high school reading (\$100 million), math (\$120 million), and advanced placement (\$28 million) programs. The budget request supports the establishment of an adjunct teacher corps (\$40 million) to help get individuals with more subject-matter knowledge into the classroom, and an expansion (\$12 million) of the State Scholars program to get more students taking stronger courses of study.

The Science, Technology, Engineering and Mathematics Talent Expansion Program—STEP—was initiated in fiscal year 2002 to support initial planning and pilot efforts at colleges and universities to increase the number of U.S. citizens and permanent residents pursuing and receiving associate's or bachelor's degrees in established or emerging science, technology, engineering and mathematics fields. In fiscal year 2003 the requested funding level for the STEP program was \$2 million, growing to a request of \$7 million in fiscal year 2004 and a request of \$15 million in fiscal year 2005. Although this pattern of support has been augmented by Congress in the appropriation process, the funding pattern reflected in the requests demonstrates steady growth and commitment to an important program at NSF.

QUESTIONS SUBMITTED BY SENATOR ROBERT C. BYRD

Question. In your testimony, you indicate that the administration is maintaining funding for the multi-agency climate change science program at approximately \$2 billion for fiscal year 2005, much of which falls within the jurisdiction of the VA-HUD Subcommittee. You also state in your testimony that the new U.S. Climate Change Science Program Strategic Plan "received high marks after a 6-month re-

view” by a committee convened by the National Academy of Sciences’ National Research Council (NRC). However, because the new 10-year science plan is quite broad and ambitious, the NRC also urged the administration to increase funding commensurate with the expansion of the program’s stated research goals. Does the administration now plan to ask for an increase in funding for this expanded research agenda that will match the ambitious nature of the recently released strategic plan?

Answer. The NRC also advised that, given the current budget outlook, prioritization would be essential for meeting the goals of the strategic plan. The President’s budget takes steps to identify priorities and reallocate funding accordingly. New resources are proposed to advance understanding of aerosols, better quantify carbon sources and sinks, and improve the technology and infrastructure used to observe and model climate variations.

Question. If you are not going to receive the increased funding needed to provide sufficient resources for the new climate change science plan, how will you move forward to achieve the stated goals of this expanded program for climate change science research?

Answer. Congress itself plays the primary role in appropriating Federal funding for climate change science, and the administration will continue to work closely with Congress to ensure that funding for this research is sustained and managed in alignment with the priorities set forth in the strategic plan.

The strategic plan outlines scientific goals, objectives, and questions, and provides guidance on near-term priorities. The Climate Change Science Program conducts an annual review of the ongoing projects and must decide which ones to expand and which ones to reduce in scope with the intent to initiate new endeavors. Climate change science is very dynamic with information continually leading to new ideas and to new endeavors. Much new information is obtained from process studies, such as the North American Carbon Program, and from demonstration of a new measurement concept, such as the Orbiting Carbon Observatory, both of which have limited durations. At the conclusion of a process study or demonstration project, funds become available for new endeavors. In addition, climate science is an international enterprise, as outlined in a separate chapter in the strategic plan, and has been for half a century. The United States partners with others in climate change science to leverage its investments to achieve synergism. For example, the 40-country intergovernmental Group on Earth Observations, which was established at the Earth Observation Summit in Washington in July 2003, is developing an implementation plan for a comprehensive, coordinated, and sustained global Earth observation system, in which a climate observing system is a major component.

Question. Further, given the fact that this initiative falls under several agencies, who specifically will be tasked to make the necessary decisions and set priorities?

Answer. The Climate Change Science Program is provided direction by a group of senior-level career officials representing all 13 agencies and departments involved in the program. The Office of Science and Technology Policy, Office of Management and Budget, Council on Environmental Quality, and National Economic Council provide oversight of the Climate Change Science Program. The Climate Change Science Program works by consensus and reports its decisions to the Interagency Working Group on Climate Change Science and Technology on a regular basis, usually at 2-month intervals. When the Climate Change Science Program directors are unable to make a decision, guidance is requested from the Interagency Working Group, which is composed of Under or Deputy Secretaries and senior Executive Office of the President (EOP) officials. The Interagency Working Group reports to the cabinet-level Committee on Climate Change Science and Technology Integration, whose Chair and Co-Chair rotate annually between the Secretary of Energy and the Secretary of Commerce.

Question. Last week an influential and renowned group of scientists, including 20 Nobel laureates, issued a statement raising serious concerns about the Bush Administration’s distortion and sabotage of science. Many of these individuals have served with distinction in former Republican and Democratic administrations.

Solid science is a critical underpinning of constructive policy making. Policy-makers rely upon credible, peer reviewed, objective scientific analysis and advice in the pursuit of good decision making in such fields as food safety, health care, biomedical research, the environment, and national security. These scientists have asserted that the Bush Administration is advocating policies that are not scientifically sound, misrepresenting scientific knowledge, censoring and suppressing information, and misleading the public to pursue its ideological agenda.

Your agencies are seen as leading voices within the Federal Government with regard to the application of good science, and, therefore, it is incumbent upon you to ensure that scientific integrity is maintained. I am concerned that there is now a

contemptible lack of oversight and that the public's trust in the Federal Government's scientific credibility and integrity will be undermined in the long term.

What steps will you take to ensure that science and the pursuit of scientific reviews in the service of policymaking does not become overly politicized?

Answer. President Bush believes policies should be made with the best and most complete information possible, and expects his administration to conduct its business with integrity and in a way that fulfills that belief. I can attest from my personal experience and direct knowledge that this administration is implementing the President's policy of strongly supporting science and applying the highest scientific standards in decision-making.

Question. Are you prepared to make any specific recommendations to restore scientific integrity to policymaking?

Answer. The administration's strong commitment to science is evidenced by impressive increases devoted to Federal research and development (R&D) budgets. With the President's fiscal year 2005 budget request, total R&D investment during this administration's first term will have increased 44 percent, to a record \$132 billion in fiscal year 2005, as compared to \$91 billion in fiscal year 2001. President Bush's fiscal year 2005 budget request commits 13.5 percent of total discretionary outlays to R&D—the highest level in 37 years.

In addition to enabling a strong foundation of scientific research through unprecedented Federal funding, this administration also believes in tapping the best scientific minds—both inside and outside the government—for policy input and advice. My office establishes interagency working groups under the aegis of the National Science and Technology Council for this purpose. In addition, this administration has sought independent advice, most often through the National Academies, on many issues. Recent National Academies reviews of air pollution policy, fuel economy standards, the use of human tests for pesticide toxicity, and planned or ongoing reviews on dioxin and perchlorate in the environment are examples. The administration's climate change program is based on a National Academies report that was requested by the administration in the spring of 2001, and the National Academies continues to review our programs and strategic research planning in this field. The frequency of such referrals, and the high degree to which their advice has been incorporated into the policies of this administration, is consistent with a desire to strengthen technical input into decision-making.

Question. According to news reports, the Bush Administration is said to “stack” panels with members whose scientific viewpoints agree only with the administration's positions. Even basic science classes teach the importance of a broad range of sampling when trying to find scientific truths. How can the public have any confidence that scientific positions taken by this administration have any basis in fact?

Answer. Suggestions of a political litmus test for membership on technical advisory panels are contradicted by numerous cases of Democrats appointed to panels at all levels, including Presidentially appointed panels such as the President's Information Technology Advisory Council, the National Science Board, and the nominating panel for the President's Committee on the National Medal of Science. And, in fact, I am a lifelong Democrat.

Every individual who serves on one of these advisory committees undergoes extensive review, background checks, and is recognized by peers for their contributions and expertise. Panels are viewed from a broad perspective to ensure diversity; this may include gender, ethnicity, professional affiliations, geographical location, and perspectives.

Question. Will you press for changes to ensure that a range of scientific views are included on these panels?

Answer. I have discussed the issue of advisory committees with the Federal agencies mentioned in the Union of Concerned Scientists (UCS) document and am satisfied with the processes agencies have in place to manage this important function. I can say that many of the cited instances in the UCS document involved panel members whose terms had expired and some were serving as much as 5 years past their termination dates. Some changes were associated with new issue areas for the panels or with an overall goal of achieving scientific diversity on the panels. Other candidates may have been rejected for any number of reasons—this is ordinary for any administration.

My office is involved in recommending candidates for the President's Council of Advisors on Science and Technology, the President's Information Technology Advisory Committee, and the nominating panel for the President's Committee on the National Medal of Science. I have intimate knowledge of the selection process for these committees. This process results in the selection of qualified individuals who represent a wide range of expertise and experience—the right balance to yield quality advice for the President on critical S&T issues.

QUESTIONS SUBMITTED TO THE NATIONAL SCIENCE FOUNDATION

QUESTIONS SUBMITTED BY SENATOR CHRISTOPHER S. BOND

NATIONAL ACADEMY OF SCIENCES REPORT ON NSF PRIORITY SETTING FOR MAJOR RESEARCH FACILITIES

Question. Due to the perceived subjectivity of NSF's priority-setting process for large research facilities, there has been an increased effort by various scientific interest groups to lobby the Congress on their specific project. In response to this concern, we asked the National Academy of Sciences to develop criteria to rank and prioritize large research facilities and they have responded.

Do you support the Academy study?

Answer. Yes. The report recommends that NSF provide greater transparency and formality to its process of selecting large facility projects for funding, followed by construction with effective oversight. The recommendations present significant opportunities for NSF to enhance its capabilities, to articulate its selection of large projects to others in government and to the research community, and to provide effective management and oversight of these projects during their construction and operations phases.

Question. When will you be able to provide the committee with a prioritization of all the current, and proposed, activities in the MREFC account fiscal year 2005?

Answer. The fiscal year 2005 budget contains a prioritization for the three new MREFC projects that are proposed. They are, in order of priority, the National Ecological Observatory Network, the Scientific Ocean Drilling Vessel, and Rare Symmetry Violating Processes. These projects have been extensively peer reviewed prior to selection, and then were subjected to further consideration and ranking by the NSF's MREFC Panel, followed by further consideration and approval by the NSB, followed by submission to OMB.

Question. How long will it take NSF and the National Science Board to implement the recommendations?

Answer. The overall recommendations are in the process of being implemented. The details of how these recommendations will be incorporated into NSF policies will require further time and are the subject of ongoing discussions between NSF and the NSB. This was on the agenda at the March NSB meeting and will continue at the May and August meetings with a goal of completion in early fall.

MINORITY-SERVING INSTITUTIONS

Question. Last year, this subcommittee emphasized the need for NSF to pay more attention to funding at Minority-Serving Institutions. We even required NSF to identify an individual in senior-level management to assist Minority-Serving Institutions in interacting with NSF. However, I notice in this year's budget request NSF is cutting funding to the Historically Black Colleges and Universities by nearly 20 percent.

Why is NSF not paying attention to what is clearly a priority of Congress?

Answer. NSF efforts in supporting science, technology, engineering, and mathematics (STEM) research and education capacity at Historically Black Colleges and Universities (HBCUs), and other Minority-Serving Institutions (MSIs), are not limited to EHR programs alone. There are numerous efforts across the agency promoting the advancement of women and racial/ethnic minority students to increase their participation in the STEM enterprise. Agency investments in MSIs in both research and education have increased from \$97 million in fiscal year 1998 to \$148 million in fiscal year 2003.

NSF is focusing its efforts on assisting (MSIs) by working to improve diversity efforts and initiatives throughout the Foundation's scientific and educational programs. In fiscal year 2005, NSF research directorates will continue with significant investments in the Science and Technology Centers (STCs) where MSIs participate as collaborating partners. Centers bring people, ideas, and tools together on scales that are large enough to have a significant impact on important science and engineering challenges. This approach reflects NSF's efforts to strengthen partnerships and collaborations between NSF research centers, HBCUs and other MSIs.

Question. Can you provide us with details concerning the senior-level position for assisting minorities called for in the conference report?

Answer. NSF has filled the position. Dr. Thomas Windham took office on February 15, 2004, as Senior Advisor for Science and Engineering Workforce. Dr. Windham will serve as NSF's principal liaison to Minority-Serving Institutions.

INFORMATION TECHNOLOGY RESEARCH

Question. Information Technology Research has been a priority for several years at NSF, yet it is not this year. We have provided significant resources in the past to ITR, but NSF has chosen to redistribute \$40 million in funds from ITR to other computing research areas.

Does this funding change signal that there is no longer support for ITR?

Answer. Information Technology research continues to be a high priority at NSF. As a “formal” priority area, Information Technology Research (ITR) has transformed the investments NSF makes in IT, revealing new IT research and education challenges and opportunities. It has also encouraged the national science and engineering community to conduct research that crosses traditional boundaries between disciplines, universities and other sectors, thereby advancing IT research and applications. The agency’s changes in ITR are not a sign of retreat, but a plan to use this knowledge and emerging IT opportunities to boldly address new challenges.

To understand this next step for ITR, it helps to look back at the context in which ITR was begun, to consider how the ITR priority area fostered positive changes at NSF and in the university community, and how we intend to capitalize on those changes and new research and education opportunities.

The most visible support for creating the ITR program came from the President’s Information Technology Advisory Committee (PITAC). Their 1999 report “Information Technology Research: Investing in Our Future” anticipated that information technology would be “one of the key factors driving progress in the 21st century—it will transform the way we live, learn, work, and play.” The committee went on to find that “Federal support for research in information technology is seriously inadequate. The report recommended that research funding be increased by an additional \$1.370 billion per year by fiscal year 2004 with particular research emphasis on software and scalable information infrastructure”.

The PITAC report recommended some specific strategies for best use of additional research funds including designating the NSF as lead agency for the Federal effort, diversifying the modes of research support to include projects of broader scope and longer duration, supporting research teams, and funding collaborations focused on application areas that drive fundamental IT research.

NSF had also been focusing on the provision of more diverse modes of funding support and promoting interdisciplinary research, so these recommendations were used to shape a “formal” ITR priority area as well as to influence planning for NSF’s other priority areas. With generous funding of \$90.0 million for research and education and \$26.0 million for a new terascale computing system in fiscal year 2000, NSF launched the ITR priority area. Funding has grown to approximately \$313 million for research in fiscal year 2004.

NSF is poised now to institutionalize the advances made in response to the PITAC recommendations, particularly the capability developed for multi-disciplinary research that addresses applications and the new ability of the research community to work as collaborative teams.

The Computer and Information Science and Engineering (CISE) directorate has received about two-thirds of the research funds of ITR. Driven both by changes in the computer and information science and engineering disciplines as well as by the impact of the ITR priority area investments, CISE has reorganized to take advantage of both. CISE will incorporate ITR funds closely into its new divisions; the divisions will operate with clusters of programs that are positioned to operate much as ITR has operated—and will be fully capable of managing interdisciplinary projects, able to support multi-investigator teams as well as individual investigator awards, and able to work effectively with other disciplines. The core programs are being transformed by ITR as much as ITR is becoming part of the new core of CISE.

For the science and engineering disciplines outside of CISE, ITR has led investigators to a much greater appreciation for the increase of data due to new instruments and sensors, the demands to store and analyze these data and the need for research to create new methods and capabilities for their research. ITR has supported many interdisciplinary projects that address the research problems ensuing from these trends.

Through all of these efforts, ITR has been a successful force for change. The changes in how we fund IT research are not any diminution of effort, but are the next step in an evolution that responds to a changing environment, changing capabilities, new opportunities, and evolving national priorities.

MATH AND SCIENCE PARTNERSHIP

Question. In the budget request for this year, there is a proposal to move the Math and Science Partnership to the Department of Education, and to take the current program obligations and move them into the research account.

Can you please explain the rationale behind moving the program away from NSF as well as the transfer of the program into the Integrative Activities portion of the research account?

Answer. The consolidation of the Math and Science Partnership (MSP) reflects the administration's desire to focus the program on integrating research-proven practices into classroom settings. In addition, it will allow the program to concentrate attention and resources in a single program for maximum impact.

The President's Budget requests \$269 million at the Department of Education for the MSP program in 2005, a \$120 million increase over the Department's 2004 level. This additional funding will support competitive grants targeted at improving math skills of disadvantaged high school students.

This increase in the Department of Education's MSP program is a key component of the President's Jobs for the 21st Century initiative. President Bush is committed to helping better prepare high school students to enter higher education or the workforce. This initiative is especially important at a time when 80 percent of the fastest-growing jobs in the United States require higher education and many require math and science skills.

The fiscal year 2005 budget would begin the process of phasing out the NSF program, while continuing support for out-year commitments for awards made in the first and second grants competitions, data collection, and program evaluation. NSF has requested \$80 million in fiscal year 2005 to honor outyear-funding commitments for past awards. Moving the management of the ongoing awards to the NSF Director's office is intended to maximize the coordination of NSF-funded MSP awards across NSF.

INFORMAL SCIENCE EDUCATION

Question. As I mentioned in my statement, the program for Informal Science Education is nationally recognized, and exposes millions of children and adults to science and science education. This is an excellent tool for NSF to use to encourage science literacy within the country, and can inspire kids to pursue science in education and as careers.

With this in mind, why is Informal Science Education receiving a decrease of 25 percent from the \$62.5 million that we provided in fiscal year 2004?

Answer. Through its Informal Science Education (ISE) program, NSF has served the Nation by providing increased opportunities for public understanding of science, technology, engineering, and mathematics (STEM). The proposed reduction in ISE funding reflects priority setting in a tight budget environment. Notwithstanding, NSF is committed to promoting informal science education not only through the ISE program, but also through outreach emphases in programs throughout the agency.

SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS TALENT EXPANSION (TECH TALENT) PROGRAM

Question. An ongoing concern of Congress is the need for making sure that we have enough college students with majors in science, engineering, and technology fields. Congress has consistently shown support for this program, despite the annual cutting of the budget for this program by the administration.

Why is NSF, once again, cutting Tech Talent by \$10 million, a 66 percent decrease?

Answer. The funding requested for the Tech Talent program was \$2 million in fiscal year 2003 and \$7 million in fiscal year 2004. In fiscal year 2005 NSF is requesting \$15 million. Within this funding level, the Tech Talent program will improve the ability of academic institutions to increase the number of college students who major in science, engineering, and technology fields.

Question. What are the views of NSF, the National Science Board, and OSTP, on the benefits of the Tech Talent program? Do you believe, as Congress does, that there is a strong need for this program?

Answer. Proposal pressure to the Tech Talent program continues to be overwhelming and serves as an indicator of the popularity of this program. Although all proposals are expected to focus on efforts to increase the number of STEM majors, the range of activities seen in the proposals is extremely broad. For example, institutions are proposing to focus on the recruitment and retention of students from populations underrepresented in STEM fields; to increase exposure of students to

academic or industrial research experiences starting during the students' first year of college; to make more effective linkages between community college courses and those at the 4-year institutions to which community college students transfer; to create bridge programs for at risk students between high school and college or between 2-year and 4-year institutions; to strengthen mentoring and tutoring between faculty and students and between students; to redesign courses that have proved to be major barriers to student success in STEM fields; and others. The NSF and the National Science Board have long advocated all of these efforts. The proposed reduction in budget for the Tech Talent program is a result of priority setting in a tight budget environment. Nevertheless, Tech Talent is an excellent program to help ensure the Nation has enough college students with majors in science, engineering, and technology fields.

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

Question. One program that is very important to a number of Senators, particularly from less populous States, is the EPSCoR program, which provides a mechanism for those States to develop strategies to become more competitive at the National Science Foundation.

Can you please explain why NSF chose to cut funding for EPSCoR by more than 10 percent from the \$95 million provided in fiscal year 2004?

Answer. The funding requested for the EPSCoR program was \$75 million in both fiscal year 2003 and fiscal year 2004. In fiscal year 2005 the requested level increased to \$84 million. This funding level will allow the program to meet its current obligations. In addition, this level of funding will allow continuation of EPSCoR's successful outreach program to acquaint EPSCoR researchers with NSF programs and policies. This amount is supplemented by approximately \$30 million in co-funding from the Research and Related Activities account, a mechanism to leverage other NSF programs to EPSCoR States that has accounted for over 1,100 awards to EPSCoR States totaling \$392 million for the 5-year period ending in fiscal year 2003.

Question. What system does NSF have in place to track the progress of these smaller States in becoming more competitive for NSF grants? Are there any States that could soon graduate from the program?

Answer. NSF's databases permit tracking of the numbers of proposals submitted, awards made, and funds obligated. The EPSCoR Office uses these data to track the progress of individual States and their competitiveness for NSF research awards. In addition, these systems help EPSCoR staff in their review of progress reports and results from site visits. NSF EPSCoR also uses these data in establishing eligibility for its programs and posts them on the EPSCoR website. Currently, eligibility for EPSCoR's Research Infrastructure Improvement (RII) program, as established in Public Law 107-368, is met when a State's institutions receive less than 0.70 percent of NSF research funding averaged over the 3 most recent fiscal years.

NSF has named Dr. Sherry O. Farwell to head the Foundation's Experimental Program to Stimulate Competitive Research. He will serve in a consulting capacity immediately and assume the position full-time at NSF headquarters in July. One of his first tasks will be to look at the EPSCoR program and how well it is meeting the original goals set forth over two decades ago. Among the issues he will be considering is that of eligibility and the impact that the growth in the number of eligible States has had on the program.

INTERGOVERNMENTAL PERSONNEL ACT

Question. NSF's budget again requests for 170 employees through the Intergovernmental Personnel Act (IPA). These people come from other agencies to work at NSF for up to 4 years, but typically 18 to 24 months and then return to the private sector for employment.

Can you please explain the significance of having almost 10 percent of the NSF workforce as temporary staff, and how this affects the continuity of operations at NSF?

Answer. NSF aims to employ a mixture of permanent staff, IPAs, and visiting scientists, engineers, and educators throughout the agency. NSF's permanent staff provides the stable base of knowledge and expertise needed to operate efficient and productive programs within the Federal structure. Rotators represent nearly 10 percent of NSF's total staffing, and they help provide a continuous inflow of up-to-date information and fresh, invigorating viewpoints on needs and opportunities across all of research and education. NSF will continue to foster close ties to the research and education community through the use of rotators from academic and other non-

governmental institutions who work at NSF for 1–2 years on average and then return to their institutions.

Question. Is NSF in need of more regular FTEs, beyond the 25 additional asked for in fiscal year 2005, or is there a benefit that can only be achieved through IPAs?

Answer. The Fiscal Year 2005 Request seeks funding for an additional 25 new permanent employees to address mounting pressures, and the IPA staffing level remains equal to the fiscal year 2004 Current Plan Level of 170 FTE. We anticipate that the agency will seek further staffing increases in the future to address the past 20 years of static employment levels as well as future workload pressures. Additionally, it is our plan to maintain the required level of rotators needed to bring state-of-the-art knowledge to the agency.

These issues are addressed in the forthcoming report from the National Academy of Public Administration, which committee staff has received in draft form. NSF expects that this report will provide an invaluable framework for future discussions of these issues, particularly since NAPA has recognized both the importance of rotators to NSF's mission and also the need for NSF to continue to balance the number of rotators and permanent employees based on the agency's past experience and the specific requirements of individual positions.

QUESTIONS SUBMITTED BY SENATOR LARRY CRAIG

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

Question. For fiscal year 2004, Congress appropriated \$95 million for the NSF EPSCoR program. Another \$30 million is expected from co-funding by the research directorates. How are you allocating these funds among the various EPSCoR activities?

Answer. EPSCoR expects to allocate the fiscal year 2004 \$95 million appropriation at approximately the following levels: \$57 million for Research Infrastructure Improvement awards (fulfilling commitments on current awards and initiating four new awards), \$33 million for co-funding, \$200,000 for outreach activities, and \$4.8 million for NSF Small Business Innovation Research (SBIR) and other activities. EPSCoR works closely with directorate representatives in determining annual co-funding priorities. For instance, first-time awardees typically have priority over investigators who have had previous NSF funding. As another example, potential awards from the NSF Faculty Early Career Development Program (CAREER) have high priority across NSF because of strong potential to influence the integration of research and education on EPSCoR campuses.

EPSCoR RESEARCH INFRASTRUCTURE INITIATIVE

Question. Idaho is applying for a new Research Infrastructure Initiative (RII) award this year. Under normal circumstances, the solicitation would be available by now. I understand that more than 15 States including Idaho are waiting for the solicitation. Please provide your schedule for issuing the solicitation as expeditiously as possible.

Answer. The solicitation was issued on March 17, 2004.

QUESTION SUBMITTED BY SENATOR TED STEVENS

BARROW ARCTIC GLOBAL CLIMATE CHANGE RESEARCH FACILITY

Question. In fiscal year 2004, \$5.4 million was appropriated to the National Science Foundation to be used for the Barrow Arctic Global Climate Change Research Facility, along with additional funding from NOAA. This facility will help NSF and the research community better accomplish their mission, but to date, the NSF money has not been made available.

Please explain how and when these funds will be made available to the project.

Answer. The plan for SEARCH infrastructure needs, including Barrow research support is as follows:

Background

Senate Report 108–143, accompanying S. 1584, the Senate VA/HUD Appropriations for fiscal year 2004, contained the following provision:

“The Committee fully supports the Foundation’s fiscal year 2004 priority for Arctic research under its Study of Environmental Arctic Change [SEARCH] program. Accordingly, the Committee has provided \$5,800,000 within NSF’s Office of Polar

Programs to support SEARCH infrastructure needs, including research support for the Barrow Arctic Research facility.”

Plan for SEARCH Infrastructure Needs Including Barrow Research Support

The general framework for these investments was set forth in the 2002 report to the Senate entitled, “The Feasibility of a Barrow Arctic Research Center.”

Barrow Arctic Science Consortium (BASC) Information Technology

NSF is funding a significant improvement to the Barrow IT infrastructure to support science conducted in the Barrow area. BASC established an IT capability last year, and this year NSF will continue to support its development, operation and maintenance. Specifically, wireless LAN capability will be added with a 10-mile radius to support connectivity to tundra, sea-ice and ocean science field teams. (Cost estimate for fiscal year 2004: \$500,000)

North Slope Coastal Current Radar System

NSF and the Department of the Interior’s Minerals Management Service are considering joint funding for the acquisition and deployment of coastal radar systems along the North Slope, most likely located in or close to Barrow. The initial investment could be a high frequency radar for surface current mapping. This technology is well advanced and would provide surface current maps of high reliability. In addition, plans will be developed for the deployment of microwave radars for mapping of surface ice fields. Such radars have been employed along the northern coast of Hokkaido (Sea of Okhotsk) for many years; their use in Alaska will be discussed at a multi-agency meeting in Anchorage, Alaska, on March 31 and April 1, 2004. (Cost estimate for fiscal year 2004: \$600,000)

Study of the Northern Alaska Coastal System (SNACS): An Arctic System Science and SEARCH Program

A program announcement is currently active with a mid-April deadline. This solicitation seeks proposals focused on the Arctic coastal zone of Alaska (see below for details) addressing one or more aspects of two coupled themes:

- How vulnerable are the natural, human, and living systems of the coastal zone to current and future environmental changes in the Arctic?
- How do biogeochemical and biogeophysical feedbacks in the coastal zone amplify or dampen change locally and at the pan-arctic and global levels?

Up to \$8.0 million is expected to be used to support the competition and \$2.0 million is set aside from the fiscal year 2004 SEARCH infrastructure funding to support needs identified in the proposals; half of the infrastructure funds will likely be used to address Barrow infrastructure needs. These may include new laboratory, instrumentation and connectivity capabilities. Funding recommendations based on external merit review are expected to be made by July 2004.

Toolik Field Station Winter Facilities Upgrade

The broad nature of SEARCH requires a variety of infrastructure throughout the Arctic including a network of stations that can support scientific campaigns and long-term observation. One site identified in the Search implementation plan (http://psc.apl.washington.edu/search/Library/ImplementOctober_R1.pdf) is Barrow, but Toolik also is noted as it provides the necessary infrastructure for terrestrial research and affords access to three major physiographic provinces including the Brooks Range, the Arctic Foothills, and the Arctic Coastal Plain. The station also serves as a base camp for researchers working along the ecological transect from tundra to taiga to boreal forest along the Dalton Highway, from Prudhoe Bay to Fairbanks, Alaska. The Institute of Arctic Biology at the University of Alaska, Fairbanks has developed a sound long-range development plan for Toolik Field Station that has guided development of the North Slope research facility over the last 4 years. The next significant increment is to build a winter support building that would significantly improve the capability to support year-round science and winter campaigns. (Cost estimate for fiscal year 2004: \$1.0 million)

North Pole Environmental Observatory (NPEO)

The NPEO is in its fifth year of operation, supported mostly by the Arctic System Sciences program and has submitted a proposal for another 5 years of operation. As was originally planned, the observatory has become a base for multiple projects in the Arctic Ocean, many of which are supporting the SEARCH goals. Part of the SEARCH infrastructure funds will be used to help continue the observations. (Cost estimate for fiscal year 2004: \$700,000)

Russian Meteorology Stations

For scientists to meet the SEARCH goals they will require the ability to make measurements and observations throughout the Arctic, including areas of the vast coastal and continental shelf system of Arctic Russia. NSF has been working with the Russian Federal Service for Hydrometeorology and Environment Monitoring and a Russian non-profit organization, Polar Foundation, to facilitate the reestablishment and improvement of manned and unmanned meteorological observatories in the high Russian Arctic. These measurements will be critical to improved modeling and understanding of the changing Arctic environment at the broadest scales. (Cost estimate for fiscal year 2004: \$600,000)

Summit, Greenland Observatory

Last year NSF funded a proposal to make a basic set of environmental observations at the Summit, Greenland research facility. The site is in a unique position to make direct observations of the free-troposphere in a SEARCH observing network. Although this project requires that the facility operate on a year-round basis, the current power and fuel systems are not ideal for this use; SEARCH infrastructure funds will be used to improve the environmental systems related to power generation. (Cost estimate: \$400,000)

National Oceanographic and Atmospheric Administration (NOAA) Collaboration

NOAA received \$8.5 million in its fiscal year 2004 appropriation for construction funds for "Barrow Arctic Research Center." NSF has responded to NOAA's call for agency input on research needs in the Barrow area and will continue to work collaboratively with NOAA on this issue.

QUESTIONS SUBMITTED BY SENATOR ROBERT C. BYRD

SOUND SCIENCE

Question. Last week an influential and renowned group of scientists, including twenty Nobel laureates, issued a statement raising serious concerns about the Bush Administration's distortion and sabotage of science. Many of these individuals have served with distinction in former Republican and Democratic Administrations.

Solid science is a critical underpinning of constructive policy making. Policymakers rely upon credible, peer reviewed, objective scientific analysis and advice in the pursuit of good decision-making in such fields as food safety, health care, biomedical research, the environment, and national security. These scientists have asserted that the Bush Administration is advocating policies that are not scientifically sound, misrepresenting scientific knowledge, censoring and suppressing information, and misleading the public to pursue its ideological agenda.

Your agencies are seen as leading voices within the Federal Government with regard to the application of good science, and, therefore, it is incumbent upon you to ensure that scientific integrity is maintained. I am concerned that there is now a contemptible lack of oversight and that the public's trust in the Federal Government's scientific credibility and integrity will be undermined in the long-term.

What steps will you take to ensure that science and the pursuit of scientific reviews in the service of policymaking does not become overly politicized?

Answer. NSF leads Federal agencies in funding research and education activities based upon merit review. In fiscal year 2003 for example, NSF made roughly 11,000 new awards from more than 40,000 competitive proposals submitted, and over 96 percent of these awards were selected through NSF's competitive merit review process. All proposals for research and education projects are evaluated using two criteria: the intellectual merit of the proposed activity and its broader impacts, such as impacts on teaching, training and learning. Reviewers also consider how well the proposed activity fosters the integration of research and education and broadens opportunities to include a diversity of participants, particularly from underrepresented groups. The merit review system is at the very heart of NSF's selection of the projects through which its mission is achieved.

Question. Are you prepared to make any specific recommendations to restore scientific integrity to policymaking?

Answer. This administration is committed to working with the science and higher education communities to increase understanding on issues of mutual concern, but the sweeping accusations of the UCS statement go far beyond reasonable interpretations of the issues it raises and only provides partial or distorted accounts of events. The President believes policies should be formed with the best and most complete information possible and expects his appointees to conduct their business with in-

tegrity and in a way that fulfills that belief. This administration has strongly incorporated science in its policy-making processes, and encourages the highest standards be applied through independent review bodies such as the National Academy of Sciences. A recent example is the National Academy of Science (NAS) report on the Climate Change Science Program (CCSP) Strategic Plan, just released, that found:

“In fact, the approaches taken by the CCSP to receive and respond to comments from a large and broad group of scientists and stakeholders, including a two-stage independent review of the plan, set a high standard for government research programs.”

Question. According to news reports, the Bush Administration is said to “stack” panels with members whose scientific viewpoints agree only with the administration’s positions. Even basic science classes teach the importance of a broad range of sampling when trying to find scientific truths. How can the public have any confidence that scientific positions taken by this administration have any basis in fact?

Answer. Many of these instances raised involved panel members whose terms had expired; some even were serving as much as 5 years past their termination dates. Some involved a new direction in focus for that particular slot with the overall goal of achieving scientific diversity on the panels. Other candidates may have been rejected for any number of reasons—this is ordinary for any administration. This process results in the selection of qualified individuals who represent a wide range of expertise and experience—the right balance to yield quality advice for the President on critical S&T issues.

Question. Will you press for changes to ensure that a range of scientific views are included on these panels?

Answer. In accordance with the Federal Advisory Committee Act and its associated regulations (CFR Parts 101–6 and 102–3), all external advisory committees established by NSF, including review panels, Committees of Visitors, and advisory committees, seek a balanced membership in terms of the points of view represented. This requirement receives special mention in each committee’s annual report, since the reporting template includes the question, “How does the committee balance its membership?”

Beyond these formal requirements, NSF has a longstanding tradition of seeking a range of views and perspectives from the external community to inform its decision-making processes. With hundreds of proposal competitions, meetings with experts, formal workshops, and reports from commissions throughout the year, NSF is constantly listening, analyzing and responding to thoughts from the research and education community.

QUESTION SUBMITTED BY SENATOR TIM JOHNSON

EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

Question. Dr. Sherry Farwell from South Dakota was announced last week as the new EPSCoR Office Director. We in South Dakota are very pleased that Dr. Farwell is taking on this assignment, as EPSCoR is very important to our State. One matter of particular interest to us is how EPSCoR can be utilized as a conduit to ensure that more of the researchers and leaders from smaller States are included on national panels and committees.

What mechanisms or approaches might be used to implement broader representation of EPSCoR States throughout the NSF?

Answer. NSF and the EPSCoR Office in particular have focused significant efforts in broadening the participation of institutions and individuals from EPSCoR States in NSF’s activities. EPSCoR works with the NSF directorates in nominating individuals from EPSCoR States to serve on NSF advisory committees, Committees of Visitors, etc. EPSCoR also makes recommendations of EPSCoR investigators to serve as reviewers and panelists for NSF grant competitions.

NSF and the EPSCoR Office have used a number of other approaches to stimulate increased participation of EPSCoR institutions and individuals in NSF programs. For instance, NSF’s Office of Legislative and Public Affairs coordinated “NSF Days” conferences in three EPSCoR States in fiscal year 2003. The purpose of these workshops is to highlight NSF programs, familiarize university officials and investigators with successful proposal writing techniques and provide the opportunity for one-on-one discussions between NSF Program Officers and interested individuals from EPSCoR institutions.

In addition, the NSF Small Business Innovation Research (SBIR) office frequently hosts annual meetings in EPSCoR States, providing a venue for increased visibility of NSF and other agency funding for small businesses in EPSCoR States. NSF also conducts Regional Grants Conferences in EPSCoR States. These conferences draw several hundred participants from various regions of the country for 2 days of in-depth discussions of all aspects of NSF programs, funding, merit-review processes and grant administration. EPSCoR will continue to seek opportunities for involving greater numbers of individuals and institutions from EPSCoR States in NSF's programs and activities.

QUESTIONS SUBMITTED TO THE NATIONAL SCIENCE BOARD

QUESTIONS SUBMITTED BY SENATOR CHRISTOPHER S. BOND

Question. Due to the perceived subjectivity of NSF's priority-setting process for large research facilities, there has been an increased effort by various scientific interest groups to lobby the Congress on their specific project. In response to this concern, we asked the National Academy of Sciences to develop criteria to rank and prioritize large research facilities and they have responded.

Do you support the Academy study?

Answer. This year the Board will expand its ongoing examination of its role and responsibilities regarding the NSF's Major Research Equipment and Facilities Construction (MREFC) program. The National Academies report of their study examining how NSF sets priorities among multiple competing proposals for construction and operation of large-scale research facility projects to support a diverse array of disciplines has, in general, been very well received by the Board. In particular, we support the concept and value for developing a roadmap and making the MREFC priority setting process clear or transparent. While a roadmap would be very useful to assist in strategic planning and prioritization, it must be carefully structured to allow the flexibility required of an agency such as NSF that serves many disparate disciplines whose needs and opportunities change with new discoveries.

Recommendations from this study are being considered with due diligence by the Board as we develop and implement options for meeting our enhanced responsibilities, as directed by the NSF Act of 2002. We will factor the recommendations of the National Academies report on the MREFC program into our examination, and develop a process for implementing appropriate modifications to the Board's involvement with the MREFC program. The Board is in the initial phase of reviewing and addressing the National Academies recommendation, and will provide our comment directly to Congress after we have given it careful consideration.

Question. When will you be able to provide the Committee with a prioritization of all the current, and proposed, activities in the MREFC account for fiscal year 2005?

Answer. The Board approved the fiscal year 2005 submission to OMB at its August meeting. The highest priority is assigned to ongoing projects (ALMA, EarthScope, and IceCube). Recommended new starts are in the following priority order: National Ecological Observatory Network (NEON), Scientific Ocean Drilling Vessel, and Rare Symmetry Violating Processes (RSVP).

Question. How long will it take NSF and the National Science Board to implement the recommendations?

Answer. The Board is currently working with our staff and NSF senior management to develop a draft document containing an overview of the fundamental issues surrounding the process of setting priorities for MREFC projects. NSF senior management is also providing the Board with a summary of the process and activities that NSF feels already address the NRC recommendations, to varying degrees. The eventual report that the Board will approve and send to Congress will focus on making the priority setting process clear or transparent to the communities that need to know about it, making the process more effective, and clearly elucidating the role of the Board in reviewing, prioritizing and approving facilities that address the highest priority research challenges and/or provide a great opportunity to move the frontier of research forward. Such a Board report to the Congress will likely take some months to complete. In the interim, however, we expect to be able to meet routinely with appropriate Members of the Congress and their Staff to provide updates on our progress.

SUBCOMMITTEE RECESS

Senator BOND. There will be no further business to come before the subcommittee today. The hearing is recessed.

[Whereupon, at 11:56 a.m., Thursday, February 26, the subcommittee was recessed, to reconvene subject to the call of the Chair.]